Summer 7-12-2021

Medication Versus Brain-Based Treatment: Evaluation Treatment Preferences of Parents of Children with ADHD

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MEDICATION VERSUS BRAIN-BASED TREATMENT: EVALUATING TREATMENT PREFERENCES OF PARENTS OF CHILDREN WITH ADHD

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Presented to the Faculty of the Graduate School of

Stephen F. Austin State University

In Partial Fulfillment

Of the Requirements

For the Degree of

Doctor of Philosophy in School Psychology

STEPHEN F. AUSTIN STATE UNIVERSITY

August, 2021

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Abstract

Attention-Deficit/Hyperactivity Disorder (ADHD) is one of the most prevalent neurodevelopmental disorders across the world. Currently, treatment for ADHD mostly consists of either medication or behavioral therapy or a combination of both. However, research has shown that medication used as therapy for the treatment of ADHD has side effects which parents deem undesirable for their children. Therefore, recent research has focused on patient and parent preferences. Studies have found that behavioral or other treatment options may often be chosen over medications. These same studies have documented the characteristics of parents that prefer certain treatments for their children. The purpose of this study is to investigate parent treatment preferences as it relates to medication and brain-based treatment options. The results of a treatment preference survey describe three groups of parents, Medication-Based, Brain-Based, and Open parents. Results were also indicative of certain factors that influence parent treatment choice for their children with ADHD. This study seeks to provide clinicians with a better understanding of patient and parent preferences, how to navigate presenting new treatment options, and to provide information on parents' willingness to choose brain-based or other treatments for their children.

Keywords: ADHD, medication, parent preferences, brain-based treatment

Acknowledgements

I would like to thank my dissertation chair and mentor Dr. Luis Aguerrevere for his patience, guidance, and unwavering devotion to not only my dissertation but my success as a student and professional. I have developed extraordinary skills in the areas of research, problem-solving, leadership, and scientific literacy because of Dr. Aguerrevere's guidance. Furthermore, I would like to thank my committee members, Dr. Nina Ellis-Hervey, Dr. Elaine Turner and Dr. Laura Cooper, for reading and providing feedback on my manuscript and aiding in the development of my project.

Thank you to my ever-supportive husband, family, and friends for their constant love, support, and patience throughout this intense and transformative process. Specifically, I am eternally grateful for my husband TJ, my sister Nicole Lasswell, and brother-in-law Martin Lasswell for taking time out of their extremely busy lives to help edit this manuscript.

Many chapters of this dissertation were completed at Buon Giorno, a local Fort Worth coffee shop. Thank you to Buon Giorno for providing a great working space for all. This dissertation is dedicated to those who have stood beside me, and cheered me on to be the best person and professional I can be.

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Chapter I

Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) is listed in the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM) as a neurodevelopmental disorder that presents as persistent behaviors associated with inattentiveness, hyperactivity, and/or impulsivity (American Psychiatric Association, 2013). When compared to the previous edition of the DSM (i.e., DMS IV), the updated criteria were broadened and the age of onset was increased to include symptoms in adolescents and adults to aid in the diagnosis of ADHD in older individuals. This disorder has been associated with poor academic performance and social and emotional difficulties in childhood and adolescence with prolonged difficulties in adulthood (Kofler et al., 2008; Rabiner et al., 2009; Wehmeier et al., 2010).

Prevalence rates as reported by The Center for Disease Control and Prevention's (CDC) National Survey of Children's Health (2019), estimate that 6.1 million children between the ages of 2 and 17 years old have been diagnosed with ADHD. Of those 6.1 million children, 64% presented with comorbid emotional, behavioral, or conduct-related disorders. Regarding treatment, 62% were prescribed medication, 47% were in behavioral treatment for symptoms of ADHD, and 23% were not receiving either treatment. More specifically, 32.5% of adolescents received medication only, while 29.7% of adolescents received both medication and behavioral treatment. In a review by

Danielson et al. (2018), the data from the CDC's survey was further analyzed into specific demographics. It was noted that boys, adolescents between the ages of 12 and 17 years old, Black children, non-Hispanic children, children in English speaking households, children living in homes within the lowest federal income bracket, children covered by public or both public and private medical insurance, children living in the Midwest or South, and those in rural areas were more likely to have received or currently have a diagnosis of ADHD. In comparison to previous years, there was a 57% increase in children ages 2-5 years old with ADHD.

Treatment for ADHD has consisted largely of medication management, with two main types of medications, stimulants and non-stimulants, and behavioral treatments. Research has identified positive effects of medication use, including improvements on academic performance and behavioral functioning. Studies have also documented the effectiveness of behavioral treatments for symptoms of ADHD, especially in relation to long-term organization and planning skills. Behavioral treatments are recommended as first-line treatments for younger children (i.e., ages 2-5), while combinations of medication and behavioral therapy are recommended for children over the age of 6 (Subcommittee on Attention-Deficit/Hyperactivity Disorder, Steering Committee on Quality Improvement and Management, 2011; Gleason et al., 2007). However, there are indications that research has generally failed in claiming superiority of one method of treatment versus the other (Rajeh et al., 2017). Furthermore, there is documentation of the negative impact of medication management for ADHD, such as loss of appetite,

insomnia, irritability, development of tic disorders, and misuse and distribution of medications (Efron et al., 1997; Lerner & Wigal, 2008; Rabiner et al., 2009).

Although medication has dominated the field of ADHD treatment, other treatments have begun to receive the attention of research. Brain-based therapies, such as Neurofeedback (N.F.), have been investigated as alternative treatment options for ADHD. While NF is still considered to be an experimental treatment option for ADHD, research has found promising results in reducing the severity of ADHD symptoms and improving academic outcomes after a pre-determined number of sessions. Research has also suggested that the effects of N.F. last longer than those of medication even after the discontinuation of treatment (Duric et al., 2012; Gani, 2009). Previous studies have shown that a considerable number of parents have concerns over ADHD medications as a treatment option, especially when medication was the only option presented. One study in particular evaluated parent treatment choice in relation to different treatment components and found that parents responses fell into two groups, a medication avoidant group where parents were largely influenced by their desire to avoid medication; and outcome-oriented parents whose choices were influenced by the outcomes they wanted for their children (Wacshbucsh et al., 2011). Wacshbucsh et al. (2011) strongly emphasized the importance of studying parent treatment preferences in order to improve the use and effectiveness of treatments as well as the outcomes for children and their families. However, the investigators also noted that parent treatment preferences may not be fixed and could change with the start and continuation of their child's treatment, which

highlights the need to not only assess a parent's treatment preferences initially in the treatment process, but also throughout the process. Therefore, assessing the parent preferences of the treatment of ADHD (e.g., medication based or behavioral based) is an important area of focus. The purpose of this study is to evaluate parent treatment choice of ADHD for their child(ren) in regard to medication or brain-based therapy through the use of a choice task. In this study, parents completed an ADHD knowledge questionnaire which was used to compare parent choices and their knowledge of ADHD. Then, parents were asked to read descriptions of two different treatment methods and indicate their preference on cost, side effects, outcomes, and treatment components.

Chapter II

Literature Review

Attention Deficit/Hyperactivity Disorder (ADHD)

Attention Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that is seen across cultures and countries all over the world. ADHD is characterized by the Diagnostic and Statistical Manual of Mental Disorders, fifth edition, (DSM-5) as a persistent pattern of behaviors related to hyperactivity/impulsivity and inattention (American Psychiatric Association [APA], 2013). These symptoms must be present before the age of 12 but must be occurring consistently for at least the most recent six months. They must interfere with functional performance in at least two major settings, such as work, school, and home. There must also be a clear disturbance in the quality of either their occupational, academic, or social functioning, or a combination of some or all three of these aspects (APA, 2013). In academic settings, ADHD can inhibit a student's ability to learn and impair social functioning (DuPaul & Stoner, 2014). Students with ADHD can demonstrate poor academic performance, experience rejection from their peers, and have difficulties inhibiting behavioral impulses (Pelham & Waschbusch, 2004). Therefore, ADHD is typically seen in school-aged children due to the demands of the school environment. The DSM-5 states an individual's presenting symptoms must not be better explained by another disorder and cannot co-occur with a psychotic episode or schizophrenia (APA, 2013). There are three main types of ADHD: Combined

Presentation, Predominantly Hyperactive/Impulsive Presentation, and Predominantly Inattentive Presentation. Symptoms of ADHD can change over time and therefore change the presentation of symptoms in the individual (APA, 2013). For example, an individual may experience a combined presentation of symptoms earlier in life, but as an adult may experience more inattentive symptoms. This highlights the importance of continued evaluation of the criteria throughout childhood, adolescence, and young adulthood.

According to The Center for Disease Control and Prevention (CDC) in the United States in 2016, 6.1 million children, ages 2 to 17, had been diagnosed with ADHD. The CDC's data also reports that in 2016, 62% of children diagnosed with ADHD were taking prescribed medication; 47% received behavioral treatment for ADHD, with that percentage increasing to 60% for children 2 to 5 years old; 23% were not receiving either treatment; and 64% had other emotional, mental, or behavioral disorders such as conduct disorder, anxiety, depression, autism, and Tourette syndrome (Danielson et al., 2018). More specifically, for adolescents, 32.5% received medication only and 29.7% received both medication and behavioral treatment. In a review by Danielson et al. (2018), the data from the CDC's survey was further analyzed into specific demographics. Those that were more likely to have received or currently have a diagnosis of ADHD were boys, adolescents between the ages of 12 and 17 years old, Black children, non-Hispanic children, children in English speaking households, children living in homes within the lowest federal income bracket, children covered by public, or both public and private, medical insurance, children living in the Midwest or South, and those in rural areas. In

comparison to previous years, there was an increase of 57% of children ages 2-5 years old with ADHD. Further prevalence rates were specified in relation to severity as 14.5% reportedly presented with severe ADHD, 43.7% presented with moderate ADHD, and 41.8% fell within mild ADHD. Of the sample, 63.8% had a comorbid disorder with behavioral or conduct-related disorders being most common as 51.5% presented with behavioral comorbid problems; and 32.7% had anxiety-related difficulties, 16.8% presented with depressive symptoms, 13.7% had autism spectrum disorder, and 1.2% presented with Tourette syndrome. In regard to medication use, a large portion of the sample, 62%, were reportedly currently taking medications, which accounted for 5.1% of all U.S children ages 2 to 17. The children more likely to be taking medication for the management of ADHD were non-Hispanic, primarily English speaking, and children living in the South. Statistical significance was noted among the ages of children taking medications. Specifically, children 2 to 5 years old were less likely to be taking medication than school-aged children and adolescents. In regard to behavioral treatment, 46.7% with current ADHD received behavioral treatment. Several demographic differences were noted within those who received behavioral treatment. Younger children, boys, black children, and children with public insurance were more likely to have received behavioral therapy. Southern and Midwestern children in rural areas were least likely to have received behavioral treatment.

Gender differences in ADHD are evident but not well described in the literature. Slobodin and Davidovitch (2019) noted that ADHD is more prevalent in boys than in

girls; however, this could be due to an under-identification of girls with possible ADHD due to the differences in symptom manifestation across the genders. Specifically, Biederman and Faraone (2004) found that girls with a diagnosis of ADHD present with more inattentive symptoms and less hyperactive/impulsive symptoms when compared to their male ADHD counterparts. Internalizing problem behaviors are usually more difficult for caregivers and teachers to identify. Boys with ADHD have been shown to present with comorbid externalizing behaviors and disorders such as conduct disorder, oppositional defiant disorder, and aggression, which quickly call the attention of caregivers and teachers as needing intervention or treatment. Slobodin and Davidovitch indicate that boys are more likely to have been diagnosed and treated for symptoms related to ADHD than girls. Male-to-female ratios for ADHD can range from 2:1 to 10:1 (Novik et al, 2006; Ramtekkar et al., 2010; Willcutt, 2012). Slobodin and Davidovitch (2019) noted the lack of appropriate research studying the gender differences in ADHD. They described that previous studies have failed to include a suitable number of female participants and heavily relied on subjective measures of ADHD. The results indicated that parent and teacher reports showed that girls presented with significantly more inattentive symptoms than boys. However, no gender differences were noted in symptoms of hyperactivity and impulsivity. When considering objective measures of ADHD, in this case the Continuous Performance Task (CPT), gender differences were found as boys had higher impulsivity. However, no differences in performance (i.e., level of distractibility) were found between boys and girls. Another study by Ragnarsdottir et

al (2018) sought to find the gender and age differences in social skills in children with ADHD. Using subjective measures of social behaviors completed by parents and teachers, research collected social skill information on 592 children ages 5 to 10 and 215 children ages 6 to 10. Results of the study suggested that girls continued to have peer problems in younger childhood and older childhood, as compared to boys who have more peer problems in younger childhood. Their data indicated that peer problems in boys tended to decrease as they got older.

Recent studies on insurance and Medicaid eligibility of children with ADHD have shown steady increases in children with a diagnosis of ADHD. For example, Nyarko et al. (2017) describe the prevalence of children with medically managed ADHD and the differences in those with employer provided insurance coverage and those receiving public insurance (i.e., Medicaid). The researchers found that the prevalence of ADHD in children and adolescents with employer-provided insurance increased 2.2% from 2009 to 2015. Rates increased 2% among ADHD children and adolescents with Medicaid in three years, from 2009 to 2012. These findings were reportedly similar to the studies investigating raising rates of ADHD diagnosis in general.

Co-morbidity is common in those with ADHD (Jensen et al., 1997). A study conducted by Bird et al. (1993) provided data on the co-morbidity of ADHD and three other major diagnostic domains, which were conduct/oppositional disorders, depression disorders, and anxiety disorders. The data, originally collected for an epidemiological study on Puerto Rican children ages 4-16, indicated that in the children who met DMS-III

diagnostic criteria for ADD, 93% presented with comorbid conduct/oppositional disorders; 26.8% presented with symptoms of a comorbid depressive disorder, and 50.8% presented with comorbid anxiety disorders. As noted in the review by Jensen et al. (1997), a study conducted by Cohen et al. (1989) investigated rates of comorbidity among 93 children with ADD ages 9 to 18 years old, and found that 56% of those children presented with conduct disorder, 54% presented with symptoms of oppositional defiant disorder, 23% had an anxiety disorder, 24% had symptoms consistent with separation anxiety, and 13% presented with major depressive disorder.

According to DuPaul and Stoner (2014), with an average of 20 students in every classroom in schools across the U.S., at least one student in every class can be or has been, diagnosed with ADHD. Furthermore, ADHD can impair students' abilities to follow instructions, hence affect their schoolwork performance and completion. These students often have difficulties with organization, test performance, and study skills. In addition, they frequently disrupt the classroom atmosphere by engaging in impulsive behavior, such as talking out without permission, disturbing other students during group and independent work, and becoming expressively angry or frustrated when consequences for their behavior are given, or when faced with a difficult task (DuPaul & Stoner, 2014).

Students with ADHD often have difficulty with on-task classroom behavior. A comprehensive meta-analysis done by Kofler et al. (2008) found that, on average, students without ADHD are on-task 88% of instructional time, compared to those with

ADHD who are on-task 74% of instructional time. Studies show these students typically complete work at a lower rate than their non-ADHD peers, their work is often poor when compared to other students, and they have significant difficulties with staying on-task (Davies &Witte, 2000; DuPaul & Langberg, 1990; Frick et al., 1991). These off-task behaviors lead to a lack of attention to teacher instruction, leading to poor academic performance.

Difficulties in school performance are not the only problems for students with ADHD. Wehmeier et al. (2010) summarize the social and emotional difficulties associated with ADHD. In their review, the authors describe those children with ADHD tend to have significantly weaker social and communication skills with family and peers when compared to neuro-typical children and adolescents. Furthermore, since ADHD is often comorbid with other behavioral disorders, those with comorbidities show to have greater social impairments than those with ADHD only. Also discussed in the review, is the emotional impairments of children with ADHD. That is, children and adolescents with ADHD have poor emotional self-regulation, intense emotional reactions of anger and aggression, difficulty acquiring adequate coping skills, and poor empathy skills. In 2018, a study by Leaberry et al. sought to find the effect of comorbid internalizing disorders, and Oppositional Defiant Disorder (ODD) on the emotional regulation of 24 children ages 7 to 10. The researchers measured the children's respiratory sinus arrhythmia (RSA), a measure of the parasympathetic nervous system which also manages stress, as they completed a goal-blocked Card Sorting Task meant to induce stress and

frustration. The results indicated that children with ADHD and a comorbid internalizing disorder experienced greater stress and frustration as measured by the RSA when compared to a baseline phase. This study suggests a physiological component to emotional regulation in children with ADHD, indicating that the emotional regulation difficulties children with ADHD have can be linked down to a physiological level.

Physiological mechanisms, such as sleep, are also impacted by children and adolescents with ADHD. In a review by Hvolby (2015), it was reported that individuals with ADHD often have difficulties with many aspects of sleep, including but not limited to, sleep latency, bedtime resistance, shorter sleep time, daytime sleepiness, night awakenings, and difficulty waking in the mornings. Furthermore, psychopharmacological treatments for ADHD can often exacerbate these sleep disturbances (Hvolby, 2015).

Understanding the progression of ADHD from childhood into adulthood is vital in treatment planning, treatment effectiveness, and treatment choice. Research has documented the progression of ADHD into young adulthood and adulthood. Agnew-Blais et al. (2016) documented the persistence, remission, and emergence of ADHD into young adulthood. Of the participants with ADHD in childhood, 21.1% continued to meet the diagnostic criteria for ADHD at age 18. Researchers found that continued symptoms of ADHD were associated with a higher severity of symptoms, lower cognitive abilities in childhood, higher levels of impairment in functioning, and increased rates of comorbid disorders at 18 years old when compared to those whose symptoms were in remission. Agnew-Blais et al. also found that individuals who were diagnosed with ADHD in

adulthood, did not meet the criteria for ADHD prior to age 12. These individuals were associated with having fewer behavioral difficulties and higher cognitive abilities at 18 years old when compared to the ADHD persistent group. However, these individuals presented with similar symptoms, functional impairment, and rates of comorbid disorders when compared to the persistent group. Faraone et al. (2006) sought to examine the persistence of ADHD from childhood into adulthood. The study found that although the persistence of ADHD was highly dependent on the definition of persistence, there was a high rate of individuals experiencing ADHD "in partial remission" as noted in the DSM-IV criteria, as it included about 65% of the sample. However, when the criteria were restricted to those participants that met full criteria for ADHD, prevalence of persistence declined to about 15% of the participants. This evidence suggests that symptoms of ADHD may lessen with age. In a more recent study by Holbrook et al. (2016), investigated the persistence of ADHD from childhood into adulthood and specified the role of ADHD presentation in the persistence of symptoms in a community-based sample. Results indicated that the prevalence of parent-reported inattentive symptoms counts did not change with age, but the highest count of hyperactivity/impulsivity decreased with age. Furthermore, individuals with a high count of hyperactivity/impulsivity and inattentive symptoms (i.e., a combined presentation), were more likely to continue to experience ADHD symptoms into adulthood. In general, this study found that those with inattentive symptoms experience more persistence of ADHD

into adulthood than those with just hyperactive symptoms as results showed a decrease in parent-reported hyperactivity/impulsivity.

Neural Mechanisms of ADHD

Research has identified that ADHD is caused by multiple factors, such as genetic and environmental risk factors. Curatolo et al. (2010) reviewed the etiology and neurobiological basis of ADHD. They cite genetic and environmental contributions on the development of ADHD. They also found substantial evidence in the association of the frontostriatal network (i.e., includes the lateral prefrontal cortex, dorsal anterior cingulate cortex, the caudate nucleus, and putamen), differences in the basal ganglia and other structures, and changes in cortical thickness in those with ADHD.

A longitudinal study conducted by Shaw et al. (2006) studied the cortical thickness of 163 children with ADHD and 166 controls and their outcomes. The children underwent MRI assessment at least twice, once at baseline and again at follow-up. Outcomes were assessed using the Children's Global Assessment Scale (CGAS). The study found that children with ADHD showed a general decrease in cortical thickness, also referred to as cortical thinning, and, at baseline, those with worse outcomes, specifically evidenced thinning at the left medial prefrontal cortex. Overall, cortical thinning in areas responsible for attentional processes, can lead to significantly poor attentional performance and worse outcomes than individuals with ADHD but minimal cortical thinning (Shaw et al., 2006).

A review by Emond et al. (2009) found substantial evidence linking the frontostriatal network of the brain with deficits in attention, hyperactivity, and impulsivity. This network encompasses the lateral prefrontal cortex, putamen, dorsal anterior cingulate cortex, and the caudate nucleus. The review also found growing evidence of malformations in the lateral ventricles, temporal lobe, parietal lobe, and occipital lobe of individuals with ADHD. Furthermore, reductions in the size, as measured by volume of specific brain areas has also been found. Shaw and Rabin (2009) also found evidence linking abnormalities in the basal ganglia, hippocampus, and amygdala, as well as the frontostriatal network. In their review, they found that children with ADHD may experience delays in cortical maturation, which leads to differences in development and changes in adolescence and on to adulthood.

Medication treatment for ADHD can also alter brain functions, as is its purpose. For example, Clarke et al. (2001) studied the effects of stimulant medications on the EEG patterns of children with ADHD. The children's baseline EEG levels were tested prior to starting a medication regimen. After a 6-month trail of stimulant medications, a second EEG was recorded. The researchers found that the ADHD group had significantly higher delta and theta brain activity prior to the start of stimulant medication. After the 6-month medication trial, children with ADHD had altered electrical brainwave patterns and normalized their brain activity.

Medication Management of ADHD

The use of medication to manage symptoms of ADHD in children was first documented in 1937 by Dr. Charles Bradley, who used Benzedrine, also known as racemic amphetamine, to treat symptoms of hyperactivity and impulsivity (Bradley, 1937). Since then, there has been a sharp increase in medication options for the treatment of ADHD, most of which consist of methylphenidates and amphetamines (Mayes & Rafalovich, 2007). This significant increase in medication use has recently been seen in the U.S. and European countries, where there was at least an 8.8% increase in medication use in children ages 10 to 14 years old in the years between 2005 and 2012 (Bachmann et al., 2017). In general, there are two types of medications for ADHD currently available, stimulant and nonstimulant medications. Within the class of stimulant medications are different types of stimulants, methylphenidate and amphetamine. Nonstimulant medications consist of medications that primarily treat other illnesses, but that have shown to help manage symptoms of ADHD (Southammakosane & Schmitz, 2015).

Stimulant Medications

The American Academy of Child and Adolescent Psychiatry (2013) suggest the use of stimulant medications as a first-line treatment for symptoms of ADHD. Results from the Multimodal Treatment of ADHD trial showed decreases in inattention, hyperactivity, and impulsivity, and improvements in disruptive behavior, academic performance, and social relationships. Furthermore, stimulant medications have shown to improve symptoms of depression, narcolepsy, aggression, and defiance (Jensen, 1999).

A review by Southammakosane and Schmitz (2015) sought to outline the medications commonly prescribed for ADHD and provide detailed information on the components of the medications and prescribing practices. They note that stimulant medications can be broken down into two different groups, long-acting and short-acting. Within the methylphenidates, a long-acting group, are drugs such as Focalin, Concerta, Ritalin, Metadate, Methylin, Daytrana, and Quillivant. Focalin, Ritalin, and Methylin are also noted in the short-acting drugs. The long-acting amphetamines include Vyvanse, Adderall, and Dexedrine. Short-acting amphetamine drugs include, Adderall, Dextroamphetamine, and ProCentra.

Stimulant medications have been approved by the Food and Drug Administration (FDA) since April 2000, for use in children as young as 6-years-old, with certain amphetamines and dextroamphetamines having been approved for children as young as 3-years-old. Generally, ADHD medications are prescribed starting with a lower dose and titrating as needed. Furthermore, if the desired response to the drug is not achieved, physicians can change the stimulant class starting with the same dosage and titrating until desired effect is maintained (Southammakosane & Schmitz, 2015; Stevens et al., 2013).

Nonstimulant Medications

Nonstimulant medications for ADHD usually consist of medications that are primarily used for the treatment of other conditions, with the exception of atomoxetine. These medications can be classified into six different classes: tricyclic antidepressants, non-tricyclic antidepressants, specific norepinephrine reuptake inhibitors, alpha-2

noradrenergic agonists, non-schedule stimulants, and others (Budur et al., 2005). Commonly prescribed for the management of hypertension, central a-agonists medications, guanfacine, and extended-release clonidine, have been found to be effective treatments for ADHD. These medications have been approved by the FDA for use in children as young as 6 years old. Southammakosane and Schmitz (2015) note that the use of alpha 2 agonists has shown reductions in defiant, hyperactive, and impulsive behaviors, and improvements in focus and sleep. However, prescribing practices of alpha-2 agonists require strict adherence to prescription instructions due to the potential of dangerous hypo- or hyper-tension reactions. Furthermore, with medications such as clonidine, administration of the drug at night is recommended due to its sedating effects.

Atomoxetine, also known as Strattera, is a norepinephrine reuptake inhibitor created specifically for the treatment of ADHD. Banaschewski et al., (2004) described atomoxetine as a "highly selective inhibitor of the presynaptic noradrenaline transporter" (p. 103). Although this drug has been approved for children as young as 6-years-old and has been shown to be effective for the ADHD population, a meta-analysis conducted by Schwartz and Correll (2014) found its effects inferior to that of stimulants and guanfacine. The most commonly prescribed nonstimulant medications are guanfacine, clonidine, and atomoxetine.

Positive Effects of Medication Management for ADHD

The results of medication for the management of ADHD can show drastic changes in children's behavior and academic performance. A recent meta-analysis,

including 40 studies on the effects of ADHD medications on functional outcomes, indicated that medication management of ADHD significantly lowered rates of mood disorders, suicidality, criminal behaviors, substance use, injuries and accidents, and traumatic brain injuries; and had a positive effect on educational performance (Boland et al., 2020).

In a meta-analysis of double-blind placebo-controlled randomized trials with amphetamines or methylphenidates versus placebos, the authors sought to find the efficacy of these two medications for children and adolescents diagnosed with ADHD. Results of the analysis found that amphetamines significantly improved all ADHD symptomology over methylphenidates in children and adolescents. However, the study also noted significant publication bias in studies of methylphenidates, but not in those done on amphetamines (Faraone & Buitelaar, 2010).

A systematic review and meta-analysis by Kortekaas-Rijlaarsdam et al. (2019) investigated the effects of methylphenidates on academic performance and accuracy in math, reading, and spelling. Analyses were conducted on thirty-four studies exploring the effects of methylphenidates on academic productivity and accuracy. All studies also included a placebo-controlled cross-over design. When compared to placebo groups, methylphenidates significantly improved accuracy and productivity in math. In reading, results indicated significant improvements in reading accuracy but not in productivity. Results were inconclusive for spelling accuracy and productivity. The researchers also

found that improvements in academic performance were small compared to overall improvement of ADHD symptoms in children prescribed methylphenidates.

Mikós et al. (2019) sought to study the executive function and attentional performance in children with ADHD compared to neuro-typical children. Three groups of participants were identified: medicated children with ADHD, treatment naïve children with ADHD who had never been treated with methylphenidate or atomoxetine, and neuro-typical children. Children receiving medication treatment for ADHD were prescribed methylphenidate or atomoxetine. Results indicate that the performance of medicated children was more closely aligned to that of the neuro-typical children, as no significant differences between their performances were found. However, treatment naïve children with ADHD generally performed worse on tasks of attention and executive functioning.

Negative Effects of Medication Management of ADHD

Medication management of ADHD has shown significant improvements in symptoms and performance in children. However, with those improvements, studies have also documented the side effects and consequences of medication management. A study conducted by Efron et al. (1997) found that children prescribed methylphenidate and dexamphetamine were reported to experience insomnia, appetite suppression, irritability, tearfulness, anxiousness, sadness, and nightmares more so than prior to the start of medication. Furthermore, Banaschewski et al. (2004) found the following as possible side

effects: difficultly sleeping, loss of appetite, vomiting, nausea, fatigue, mood swings, dizziness, and constipation.

Lerner and Wigal (2008) reviewed the most recent studies on the safety of long-term stimulant use for management of ADHD symptoms. They reviewed articles which investigated the most common side effects of stimulant medication such as cardiovascular effects, growth, development of tic disorders, carcinogenic evidence, and effects on reproductive health. Overall, the review states that the studied negative long-term effects of stimulant medications (i.e., elevated blood pressure, stunted growth, and development of tic disorders) were clinically significant for a minority of the participants prescribed stimulant medications.

In 2015, Kidwell et al. conducted a meta-analysis to search the literature for the effects stimulant medications have on the sleep quality of children and adolescents with ADHD. The researchers specifically focused on children's sleep latency, sleep efficiency, and total sleep time. The analysis included a total of nine randomized controlled trial studies that contained objective measures of sleep (i.e., actigraphy or polysomnography). The results found significant effects of stimulant medication on sleep latency as stimulant medication use was associated with longer sleep latency. Furthermore, results also indicated that medication dosage frequency was a moderator of sleep latency, suggesting that the more frequently the medication was taken throughout the day, the longer the sleep latency. Regarding sleep efficiency, the use of stimulant medications had a significant negative impact on sleep efficiency. However, the longer the use of the

medication the less negative the effect. Lastly, concerning total sleep time, there was a moderate effect between stimulant medication and total sleep time, indicating that children on stimulant medications experience shorter sleep time.

Recent research has begun to show low strength of evidence for the use of psychopharmacological treatment of ADHD across all ages. A systematic review conducted by Charach et al. (2011) at the Agency for Healthcare Research and Quality found a low strength of evidence for the prescription of methylphenidate to 114 preschool children identified as at-risk for developing ADHD, and a presence of adverse effects on the children. Moreover, the researchers found low strength of evidence on the use of methylphenidate and atomoxetine for the reduction of ADHD symptoms and the presence of adverse effects. The 2018 update to this systematic review was unsuccessful at adding to the 2011 findings, indicating that the data has no changed significantly (Kemper et al., 2018).

Another issue that is evident in the use of medications for the treatment of ADHD is the non-prescribed or unintended use of stimulant medications. In the last decade, research has addressed the significant misuse of ADHD medications by college students as well as the self-treatment of attention problems by college students. Rabiner et al. (2009) examined the misuse and distribution to peers of prescribed ADHD medications. Participants consisted of 3,407 college undergraduates that were asked to complete a web-based survey. Of the 3,407 students, 156 students indicated that they had been diagnosed with ADHD; 115 of those diagnosed were prescribed ADHD medication. The

study shows that of the 115 students prescribed ADHD medications, 31% indicated taking their medication more often than prescribed, at a higher dose than prescribed, or using someone else's medication. Regarding diversion of medications, 56% of the 115 students with prescriptions reported being approached by other students to sell or give them their medication and 26% reported giving or selling their medications in the previous six months. These negative effects of ADHD medications have created impactful changes in the treatments available for ADHD and in the public perception on medication use.

Assessing ADHD Through Brainwave Patterns

Quantitative Electroencephalogram (QEEG)

Electrical brain wave speed is measured by hertz (i.e., electrical frequency cycles per second) and they are divided into bands to delineate slow, moderate, and fast waves (Hammond, 2011). The four most researched brain wave bands are: Beta waves, Alpha waves, Theta waves, and Delta waves. Beta waves, measured at 12-30Hz, are the smallest and the fastest brainwaves associated with an alert state of mind; Alpha waves, measured at 7-12Hz, are characterized by slower and larger waves than Beta, and are associated with being in a relaxed state of mind. Alpha waves are known to be prominent in the posterior and occipital regions of the brain. Theta waves, measured at 4-8Hz, are characterized by slower and even larger waves than Alpha, and are associated with a dream-like state or mental inefficiency. Finally, Delta waves, measured at less than 4Hz, are the slowest and largest waves and are most prominent during deep sleep.

QEEG Indicators of Neurodevelopmental Disorders

QEEG indicators have been shown to be useful for the assessment of neurodevelopmental disorders because of the close association between behavior and EEG frequency (Snyder & Hall, 2006). For example, in clinical settings, QEEG has been used to identify children with ADHD (Loo & Barkley, 2005). QEEG indicators have shown that children with ADHD have greater theta activity and lower beta activity in the brain's frontal regions than their non-ADHD peers when their eyes are open (Chabot et al., 2001) or when completing a task (Monastra et al., 2001).

A study conducted by Monastra et al. (1999) focused on the use of QEEG for assessing the presence of ADHD in 482 participants. The researchers gave traditional ADHD assessments to identify those with ADHD, then separated participants into three groups: ADHD inattentive, ADHD combined, and control. Monastra et al. (1999) found that QEEG correctly identified 86% of the individuals who were found to have ADHD through the traditional assessments, while correctly detecting 98% of those who were not ADHD.

Similarly, Clarke et al. (2001) investigated the presence of brainwave differences in a sample of 184 male children with ADHD. Participants were given full clinical assessments for ADHD then completed an eyes-closed resting state EEG using the international 10/20 system. Results indicated consistencies with past studies (Callaway et al., 1983; Clarke et al., 1998) as the ADHD group had an increase in theta and a decrease in relative alpha activity, an increase in theta/beta ratio, a decrease in frontal delta, and

increased frontal and central total power. The cluster analysis indicated three distinct groups of children with ADHD-C. Cluster 1 showed increased amplitude of theta activity, particularly in the frontal regions, while also showing a decrease in the amount of delta and beta activity. Cluster 2 demonstrated high levels of slow wave activity in delta and theta bands, with reduced fast wave activity. The largest differences between Cluster 2 and the control group were found in the posterior and central regions. In Cluster 3, analysis indicated high power beta activity with decreased delta and alpha activity. In a previous study by Clarke et al. (2002), it was found that children with high levels of beta were more likely to have temper tantrums compared to other ADHD children with a profile of increased theta. Therefore, attention can be measured and identified using QEEG indicators, and these indicators have the capacity to reliably differentiate individuals that have attention disorders from those who do not.

Neurofeedback and ADHD

Neurofeedback (N.F.), or EEG Biofeedback, is the process of retraining brain wave patterns through operant conditioning (Hammond, 2011). N.F. uses frequency training, which involves single-channel referential or sequential EEG records at a pre-determined number of electrode sites (Hammond et al., 2004). During training, patients watch a display on a computer screen and listen to feedback audio tones, which signal the reaching of a goal set by the experimenter (Hammond, 2005). Through this training, patients can adapt their brain waves into different electrical frequencies (Blanchard & Epstein, 1978; Heinrich et al., 2007; Kraft, 2006; Masterpasqua & Healey, 2003).

It has been suggested that through N.F. training, some individuals with ADHD are able to gain self-control over physiological functions that are not usually consciously perceived (Heinrich et al., 2007). However, N.F. is still considered an experimental treatment option for this condition. In a study done by Bakhshayesh et al., (2011) it was hypothesized that the improvements in the N.F. group would exceed those in the control group by measuring behavioral changes, as rated by parents and teachers, and improvements in cognitive performance tests. Also, those in the N.F. group would show decreased activity in theta and increased activity in beta waves, which are two of the most important brainwaves in those with ADHD. Thirty-eight children with ADHD, ages 6 to 14, were recruited for the study and randomly assigned to either the neurofeedback group or control group. Treatment for both groups lasted for 10-15 weeks. Children in the N.F. group were training on increasing beta and decreasing theta frequencies with electrodes placed in CPz and FCz. The control group consisted of an alternative type of biofeedback training using electromyography (EMG) with electrodes placed on the frontalis musculature for EMG amplitude measurement. Analysis indicated that the overall results of the parent and teacher rating scales show significant improvements in ADHD related behaviors after treatments on all subscales of the parent ratings and in three of four subscales of the teacher ratings. However, Bakhshayesh et al., (2011) stated that they were unable to prove whether N.F. training was superior to EMG training when studying hyperactivity and impulsivity symptoms on rating scales.

Lévesque et al. (2006) investigated the effects of N.F. training in children with ADHD on the neural substrates of the selective attentional processes involved in the Counting Stroop task. Participants were 20 children with ADHD randomly assigned to either the experimental group or control group. Those in the experimental group (N=15) received N.F. training, which consisted of enhancing beta amplitude and decreasing theta amplitude in phase one. In phase two, participants were trained to inhibit theta amplitude and increase the amplitude of beta waves. Participants in the control group (N=5) received no treatment. Results were presented in terms of pre- and post-test results. In Time 1, data were collected on the Counting Stroop task one week before training. In Time 2, data were collected from the Counting Stroop task one week after the training was concluded. It was shown that there were no significant differences between the groups in Time 1 when assessing average scores on Digit Span, The Connors Parent Rating Scale – Revised (CPRS-R), and the Integrated Vision and Auditory Continuous Performance Test (IVA). At Time 2, scores of those in the control group were not significantly different than their own scores in Time 1. However, for those in the experimental group, scores on the Digit Span and IVA were significantly higher, and scores on the Inattention and Hyperactivity domains of the CPRS-R were significantly lower at Time 2.

Gani (2009) presented the first randomized long-term follow-up study that provided data from N.F. sessions two years after the termination of treatment. Gani (2009) sought to find whether 1) after 2 years participants were able to maintain the

ability to self-regulate cortical activation, and 2) whether improvements in attention lead to differences in the stability of cortical self-regulation and clinical effects. During treatment, participants were randomly placed in two groups: Slow Cortical Potential (SCP) group and Theta/Beta group. At the two-year follow-up, participants in both groups were administered a N.F. session which involved a game with various trials in place. Generalization trials were implemented into the study to foster practice of self-regulation in daily life, where no continuous feedback was provided during the session, only after the game was over. Results yielded significant findings in the Theta/Beta group; children who did not participate in the two-year follow-up exhibited significantly higher rates of ADHD symptoms than those who did participate. Results of behavior showed that the number of DSM-IV criteria for both inattention and hyperactivity declined significantly at the two-year follow-up.

Lansbergen et al. (2011) conducted a pilot study to test the safety and feasibility of using a double-blind placebo feedback-controlled design in studying the effects of individualized N.F. training on children with ADHD. Fourteen children, ages 8-15 years old, completed the study where eight children were randomly assigned to the EEG group and six assigned to the placebo group. Since N.F. training was individualized, protocols were determined based on visual inspection of the participants' QEEG recording prior to treatment. Feasibility was assessed by adherence to attendance to the study and training sessions completed. Also, parents and children were asked whether they thought the child received N.F. training or a placebo. The safety of this design was measured by having

parents and children complete the Pittsburgh Side Effects Rating Scale (PSERS) before training and after 6, 10, 20, and 30 training sessions. The Sleep Disorders Questionnaire was used to assess for sleep problems. Efficacy of the training was measured by the total severity of inattention and hyperactivity/impulsivity symptoms, which were rated before training, during training, and 6 months after the termination of treatment. Results showed that all 14 children completed the study, and 2 out of 6 children and their parents, as well as one other child but not their parent, in the placebo group thought they received the N.F. training. Of the remaining children and parents, 75% in the active treatment group and 50% in the placebo group thought they received placebo training, which suggests that providing a placebo training as a control condition could be a feasible option to test the feasibility of N.F. When analyzing safety, neither of the conditions presented significant adverse side effects on sleep, suggesting that N.F. and a placebo training condition can be safe approaches. Although there was clinical improvement over time in ADHD symptomology, there were no significant differences between the EEG N.F. training condition and the placebo training condition. This suggests that individualized N.F. training did not exceed the placebo training group in clinical improvement on ADHD DSM-IV symptomology.

Duric, Assums, Gundersen, and Elgen (2012) recognized the immense lack of controlled studies, stating that while other studies used other treatments or waitlists as control groups, randomized control studies are still needed in the field. The objective of the study was to investigate the effectiveness of N.F. on the core symptoms of ADHD,

including attention and hyperactivity. Participants were 91 children and adolescents, ages 6-18, with a diagnosis of ADHD. Participants were randomly assigned to either the neurofeedback group, N.F. plus medication group, or only medication group. Those in the N.F. group were training to enhance beta and inhibit theta. Sessions were done three times a week, lasting 40 minutes, with 30 sessions for each participant. The pre- and post-evaluations consisted of five-minute baseline periods in the form of alpha training. In the N.F. plus medication group, neurofeedback protocols were identical to the neurofeedback group protocols. The medication taken in the N.F. in addition to medication group and medication only groups was 1 mg of methylphenidate taken twice per day as recommended. Parent reports showed an improvement in the core symptoms of ADHD in the N.F. group. Those in the N.F. plus medication group showed similar improvements. N.F. had an effect on improving attention and hyperactivity symptoms in the participants. No significant differences were found among the three treatment groups in the improvement of core symptoms of ADHD, suggesting that the effects of N.F. can be close to that of stimulant drugs. This study supports the use of N.F. as a less invasive treatment option for those with ADHD, especially the 20% of the ADHD population that do not respond to stimulant medication.

Steiner et al. (2011) investigated the effects of two computerized training programs on teaching children with ADHD to attend better. Participants were 41 children with ADHD from two middle schools. They were randomly assigned to a N.F. group which received two sessions a week: a) the attention training through a standard

computer format (SCF) group, where the participants completed visual and auditory activities designed to reduce impulsivity and increase attentiveness, or b) the waitlist condition, which received no treatment until after the post-intervention assessments were completed. In the N.F. training group, children were trained to decrease theta frequencies and increase beta frequencies. The Connors Rating Scales – Revised (CRS-R), the Behavior Assessment Scales for Children (BASC), and the Behavior Rating Inventory of Executive Functions (BRIEF) were used as outcome measures. Results were mixed, showing that students in the waitlist condition reported significant change on the CRS-R ADHD Index, and those in the SCF condition reported significant change on the BASC Attention Problems Scale. When analyzing observed behavior, those in the N.F. group showed a trend toward lower levels of fidgeting and off-task behaviors. However, there were no significant findings. Parents whose children were in the N.F. condition reported significant changes on all three CRS-R and the two BASC subscales. In the SCF condition, parents reported significant changes in the CRS-R Inattention and ADHD Index, BASC Attention Problems, and BRIEF. Overall, Steiner et al. (2011) show the difficulty of maintaining reliability when conducting N.F. sessions outside of the clinical setting.

Public Perception

Public perception can be defined as a social construct where the opinion of a group of people is collected by asking for their preference or thoughts on particular topics and used to create a multitude of services and products (Dowler et al., 2006). Public perception is assessed in almost every industry worldwide and drives the creation and modifications of policies, technology, education, and more.

In recent years, research focused on the public perception of mental health across many ages and cultures. Evaluating public perceptions of mental health treatments can aid in the marketing, creation, and improvement of potential and existing treatment methods. Therefore, most of this research has revolved on how to change the negative perceptions that the public holds concerning individuals with mental health illnesses and the stigma of seeking services. For example, Gaebel et al. (2006) studied the relationship between the severity of mental illness and the stigma, or public perception, of that illness. The researchers analyzed studies that used attitude surveys towards diagnostic labels and other aspects of mental health. In their review, they found that public perception changed depending on the diagnostic label and the psychosocial disability.

In 2007, Vogel et al. investigated the links between perceived public stigma and willingness to seek mental health therapy. The participants consisted of college students enrolled in a psychology course. Participants completed the Perceived Devaluation-Discrimination scale, Self-Stigma of Seeking Help Scale, Attitudes Toward Seeking Professional Psychological Help Scale, and the Intentions to Seek Counseling Inventory.

Results indicated that perceived public stigma is positively associated with self-stigma, self-stigma is negatively related with individuals' attitudes concerning counseling, and the attitudes are positively related to the willingness of individuals to seek therapy. In other words, as public stigma increases, or becomes more negative, so does self-stigma; and as self-stigma increases, attitudes or willingness to seek counseling decreases. The researchers stated that although it is difficult to change public perception of mental health services, knowledge of the mediators between stigma and willingness to seek help can aid in the development of alternative, practical, and more efficient treatments.

In an effort to investigate parents' willingness to use psychiatric medication for the treatment of mental health illness in children, Pescosolido et al. (2007) found substantial evidence that parents have significant concerns of the stigma surrounding the treatment of children with mental health needs. Most of the study's sample (68%) indicated that they believe physicians over-medicate children, and 45% reported that a child with mental health needs would experience alienation or rejection in school. Results also indicated that 35% of the participants believed parents experience self-stigma as a result of their child's mental health needs. The researchers discuss the importance of this information for the development of future treatment options and for mental health and medical professionals to be prepared when confronted with skepticism. There are significant concerns that stigma associated with children's mental health and the treatment, especially regarding medication, present as a barrier to seeking and being willing to engage in mental health treatment.

Assessing Parent Perception of ADHD

In 2003, a study on parent perceptions and satisfaction with medication for ADHD found that over half of the sample was hesitant to trying medication management for their children due to public information on medications. Researchers also found that parents were generally misinformed on ADHD medication treatment and stated that more information is needed on perceptions of ADHD medications and the differences among race/ethnicity, income, and social status (DosReis et al., 2003).

A study by Bussing et al. (2012) investigated the ADHD treatment perceptions of adolescents, parents, healthcare professionals, and teachers. They studied each group's views of two pharmacological and three psychosocial treatment methods and their willingness to participate in all five treatments. Results indicated that adolescents showed significantly lower desire to engage in any treatment for ADHD. Parents and healthcare professionals indicated more willingness towards employing/recommending counseling than teachers. Regarding the use of short-acting or extended-release ADHD medications, short-acting medications were associated with negative attitudes. However, extended-release medications did not have a negative association. Overall, short-acting medications were generally viewed more negatively as parents, teachers, and adolescent respondents associated them with a negative stigma, physiological and psychological side effects, and a greater possibility of future drug dependence, more so than long-lasting medications.

DosReis et al. (2003) conducted a survey study examining parental perceptions and satisfaction of stimulants as a treatment for ADHD. This study found that around

55% of parents were at first hesitant for their child to use medication due to the information in the media, and 33% reported that they believed too many children are prescribed medication for ADHD. Parents also reported being more satisfied with their child's academic and behavioral improvement more so than any improvements in their child's self-esteem.

In 2016, Wymbs et al. used a Discrete Choice Experiment to assess parent preferences between group parent training or individual parent training programs and how their preference would affect their participation in the training. The study found that over half of the sample (58.7%) preferred individual parent training and were more interested in trainings that would help them understand their child and their problems with ADHD instead of a training that would solve their child's problems. 19.4% of parents in the sample reported being most interested in group parent training programs that would help them build the skills needed to solve the problems their child experiences. Of particular interest was the 21.9% of parents that fell in what the study labeled Minimal Information, meaning the parents did not choose either training option. These parents reported that their child presented with the highest levels of depression and most severe mental health concerns. The researchers indicated that their results show a need to consider alternative therapy formats for parent trainings for families that experience high levels of stress due to the symptoms of ADHD coupled with other life factors.

A study by Fegert et al., (2011) sought to examine parent treatment choice for their children with ADHD using a Discrete Choice Experiment as it relates to medication. More specifically, the study was to evaluate what therapy attributes were most important to parents. The researchers used both qualitative and quantitative measures to assess what factors influence a parent's choice. The study analyzed the self-administered surveys of 121 parents of school-aged children. The survey generally assessed what attributes and outcomes of the treatment were most important to the parents. There were 23 total attributes included in the Discrete Choice Experiment. However, the attributes were condensed down to six general attributes. The six attributes were duration of action of the treatment, whether whole-day or half day; side effects; dosage of the product; discretion of use of the treatment; emotional situation; and social situation. Results found that parents assigned importance to all six attributes as they were all statistically significant. However, the improvement of their child's social performance was the most important treatment attribute to the parents surveyed. The second most important attribute was an improvement in emotional functioning and long-acting effectiveness of medication. The results also showed that the least important attributes for parents were the side effects of the treatment as long as they did not interfere with the social and emotional functioning of their child.

In 2011, Waschbusch et al. examined the treatment preferences of 183 parents of children with ADHD that were not being treated with medications. Parent preference was assessed using a discrete choice task where parents were presented with brief descriptions

of the three treatment choices along with possible side effects and risks. Parents chose the treatment they would prefer their child to receive. According to the results, parents could be clustered into two groups, Medication Avoidant (70.5% of parents), who were mainly driven to avoid medication use for their child, or Outcome Oriented (29.5% of parents), who were more focused on alleviating their child's problems. This study also found specific demographic differences in the groups. Parents in the Outcome Oriented group were more likely to be single parent, had few years of education, lower socioeconomic status, higher reported stress, and depression, and had behaviorally challenging children. Using data simulators, Waschbusch et al., (2011) were able to determine what treatments parents would likely choose. They found that most parents would have rejected medication only options and instead heavily considered behavioral treatment only or combined medications and behavioral treatment options. The results demonstrate that even when presented with multiple options, parents show a preference for non-medication treatment.

Summary and Study Rationale

ADHD is associated with a variety of academic, social, and occupational problems such as difficulties retaining educational information, difficulties controlling emotional and behavioral impulses, and problems keeping up with daily demands. Since 1937, the use of medication management has been the most widely used treatment for ADHD. Medications for ADHD include stimulants and non-stimulants, each with their own drug classes. Stimulant medications (i.e., methylphenidates and amphetamines) are

the most frequently prescribed and have been associated with positive effects on reducing ADHD symptomology. Non-stimulant medications (i.e., drugs primarily used to treat other illness and atomoxetine), have also been found to have similar effects, but not as potent effects as stimulant medications. However, in the last decade there has been a plethora of studies focusing on the negative effects of medication treatment for ADHD. Studies have shown that stimulant medications can have short-term and long-term side effects that many parents find highly problematic (e.g., sleep disruptions, appetite suppression, growth impairments, higher probability of substance use later in life, and mood disruptions).

Due to these undesirable effects of medication management for ADHD, other treatment options have become available. Brain-based treatment such as N.F. is one of these options. Although still considered an experimental treatment, a decade of research has found promising results in reducing ADHD symptomology. Studies have documented reductions in hyperactivity, impulsivity, and inattention while also being able to maintain these reductions long after the discontinuation of treatment, with a few "booster sessions" conducted periodically.

Parent perceptions on the treatment of ADHD indicate a significant gap in the treatments available, as most parents believe there are limited treatment choices. Studies show that parents are generally weary of medication management for ADHD, and imply that some parents feel as if they have very limited choices for the effective treatment of ADHD. Currently, there are few studies that evaluate parent perceptions of brain-based

treatment options. Additionally, there is limited research that studies the public perception of neuromodulation as a treatment option in general. Therefore, the purpose of this study is to 1) evaluate parent treatment choice of ADHD in regard to medication or brain-based treatment; 2) to evaluate the viability of brain-based treatment from a parent perspective; 3) to assess the variables that influence parents' choices; and 4) to help clinicians build brain-based practices and aid in the effective marketing of brain-based treatments to parents of children with ADHD.

Hypotheses

The following are the specific hypotheses that will be tested in this study:

I. When compared to brain-based treatment, parents will be predominantly medication oriented due to its low cost, easy administration, and quicker response to treatment.

II. Based on the findings by Waschbusch et al. (2011), it is hypothesized that although insignificant, a large number of parents will fall in the brain-based oriented group due to a high number of parents that are against medication management for ADHD.

III. Parents who score higher on the AKOS-R (i.e., have more knowledge of ADHD) will be more likely to be medication avoidant.

Chapter III

Method

Participants

The current study had a total sample of 203 participants. Participants were recruited via online social media parent groups for children with ADHD (See Appendix A for list of social media groups used). For this study, 137 parents of children with diagnosed ADHD inattentive, hyperactive/impulsive, and combined presentations completed the survey in its entirety. Participants were excluded if they did not complete the survey in its entirety (N=66). Participants consisted of mostly female caregivers (97.8%). The majority of the sample's children (82.5%) were receiving treatment for ADHD. Age of the parents who participated ranged from 21 years old to 59 years old. The sample was mostly white (86.1%) and had a bachelor's degree (35.8%). The majority of the sample had not been personally diagnosed with ADHD (83.2%). See Appendix B for descriptive statistics for the study's sample. In the autoclustering analysis, the best representation of the sample for the 135 participants was the three-cluster solution.

Measures

A brief demographics survey was presented to assess for possible extraneous variables, exclusion criteria (i.e., not having a child diagnosed with ADHD), and to gather demographic information on parents and their children.

Participants were presented with a survey assessing treatment preferences of ADHD. Participants had two treatment options to choose from: 1) medication use; and 2) neuromodulation techniques, specifically Neurofeedback. Participants received The ADHD Treatment Choice Task for Parents. This task is a modification of the choice task developed by Waschbusch et al. (2011). The task includes brief descriptions of each of the treatment components: – describing the techniques and procedures that could be used in the treatment, and treatment outcomes; – describing any changes that could result from the treatment, and side effects; and – describing negative effects and costs of treatment (Appendix C).

The ADHD Treatment Choice Task for Parents was assessed through a pilot study using 10 doctorate-level graduate students enrolled in a Southwestern university. The results of this pilot study can be found in Appendix D. The results show that the majority (90%) of respondents may regret the treatment choice if the child experiences long-lasting side effects. Conversely, 60% of respondents reported that short-term side effects would not make them regret their treatment choice. Half of the sample indicated that they would spend $50 to $500 a month on long-term treatments, while 10% said they would spend $1200 a month on treatment, as long as the treatment did not last longer than six months. In 70% of the respondents, insurance coverage would influence the treatment choice. Concerning scientific validity, 90% of the sample indicated that they would only choose a treatment options that has strong scientific evidence. 40% of the sample reported they would like the treatment to have some sessions with the treatment provider,

and 60% stated they would like the treatment to include a therapeutic component. Regarding immediate changes in behavior, 80% of the sample indicated that it is not important for their child to experience immediate changes, as long as they were assured that changes would occur later. The majority of the sample (44.4%) reported that when symptoms are no longer observed, they would prefer their child not need further treatment other than booster sessions. Regarding child awareness and treatment components, 90% of respondents stated that it was important for them to choose a treatment that would help the child become more aware of their condition, 77.7% stated that their child would take a low dose of medication, and 77.7% also endorsed that their child would attend some sessions of brain-based treatment.

The Attention-Deficit/Hyperactivity Disorder Knowledge Scale – Revised (AKOS) was used to assess parents' knowledge of ADHD and effective treatments. The AKOS is a 43-item true/false survey designed to measure parent knowledge of and attitude towards ADHD and various evidence-based treatment options (Appendix C, Figure 2). Parents completed only the first 17 items as this comprises the Knowledge Scale (Owen Currier, 2004).

Procedure

After providing their Informed Consent, participants completed a demographics survey to document if they are a parent of a child with ADHD, their gender, age, ethnicity, years of education, whether their child is receiving treatment for ADHD, and whether they as parents have been formally diagnosed with ADHD. After completion of

the demographics survey parents completed the AKOS-R where they were asked to indicate their belief on whether various statements about ADHD were true or false.

Participants were then presented with the choice task which was comprised of brief descriptions of each treatment option; descriptions included the costs, side effects, and possible outcomes. Participants choose their preference as it related to side effects, costs, scientific validity, treatment sessions, therapeutic components, immediate changes, continuation of treatment, child awareness, and treatment components.

Chapter IV

Results

Statistical Analyses

The present study is an exploratory design consisting of mixed methods of quantitative measures (i.e., Cluster Analysis) and qualitative measures (i.e., description on clusters). To analyze the data of this study's exploratory design, a variety of statistical analyses were conducted. Statistical analyses were conducted using the IBM SPSS program. To reduce Type I error, this study used a $p<.05$ significance level. Totals and percentages for the sample were collected and used for overall analyses (See Appendix B). A Cluster Analysis was conducted to identify potential groups or clusters of parents within the responses to the Treatment Choice Task for Parents. Cluster Analyses are used in exploratory research to find groups within data. The groups are not assigned needing in terms of dependent and independent variables and must be assigned meaning in a descriptive fashion (Field, 2013). A factor analysis was also conducted on the Treatment Choice Task for Parents to ensure differentiation between the items within the task. Factor Analyses aid in identifying whether questions or items of a task or questionnaire are different or similar to one another. This analysis is important to establish reliably of a measure's individual items. For the purposes of this study, the factor analysis also serves as a method to find consistencies in questions that can be grouped together as shown in Table 6.

Cluster Analysis

Defining the Number of Clusters. An exploratory two-step cluster analysis was conducted using each item of the ADHD Treatment Choice Task for Parents. The autoclustering function from SPSS was used to find the best cluster solution. The SPSS autoclustering functioning selects the lowest information criterion measure as the best solution (the Schwarz Bayesian Information Criterion; BIC) and the highest ratio of distance measures (RDM; "SPSS 14", 2005). An Autoclustering solution is affected by the order of the data (Milligan & Hirtle, 2003). Therefore, the full data set was ordered by the participants' IP addresses alternating in an ascending and descending fashion. Results showed two optimal numbers of clusters, those being the three- and four-cluster solutions. There was not a substantial difference in variance between the three (*BIC* = 3872.6) and four (*BIC* = 3863.1.7; *RDM* = 1.0) cluster solution. Therefore, the three-cluster solution was chosen as the distribution of data is best explained within three clusters for the three choice options within the ADHD Treatment Choice Task for Parents.

A Chi-Square analysis aided in explaining if the distribution of the results of this study (i.e., study's sample) statistically differed from the expected distribution (i.e., population). This analysis was chosen to identify differences between the two categorical variables in the study (i.e., medication-based or brain-based). Upon inspection of the chi-square results for the three- and four-cluster solutions, the four-cluster solution was removed from formal analyses as the three-cluster solution best explains the distribution

of the data. However, the four-cluster solution analyses are provided for review in Appendix E.

As seen in Table 1, 88.1% of respondents in Cluster 1, 93.5% of respondents in Cluster 2, and 66.7% of respondents in Cluster three reported that their child was currently receiving treatment for ADHD, suggesting that Parents in Cluster 3 were less likely to have their children in treatment for ADHD. Parents in Cluster 2 reported having their children in treatment more so than parents in Clusters 1 and 3. Furthermore, although not significant, Cluster 2 had the highest percentage of parents diagnosed with ADHD (i.e., 22.6%) and parents in Cluster 3 (i.e., 8.9%) were less likely to have been diagnosed with ADHD themselves. There were no significant differences in education, gender, and race/ethnicity between the clusters.

Table 1

Chi-Square Demographics Results for the Three-Cluster Solution

Variable	Cluster 1 N=59(43.70%)	Cluster 2 N=31(22.96%)	Cluster 3 N=45(33.33%)	X_2	*p*
Child receiving treatment for ADHD?	88.1	93.5	66.7	11.58	.003
Parent (participant) diagnosed with ADHD/ADD?	18.6	22.6	8.9	2.95	NS

Table 1 Continued…

Variable	Cluster 1 N=59(43.70%)	Cluster 2 N=31(22.96%)	Cluster 3 N=45(33.33%)	X_2	p
Education					
Diploma/GED	10.2	6.5	11.1		
Associate's Degree	16.9	16.1	4.4		
Bachelor's Degree	28.8	29.0	48.9	10.46	NS
Master's Degree	25.4	32.3	28.9		
Doctorate/advanced degree	18.6	16.1	6.7		
Gender					
Female	98.3	93.5	100	3.65	NS
Male	1.7	6.5	0.0		
Race/Ethnicity					
Hispanic	5.1	12.9	8.9		
Black	3.4	3.2	0.0	7.50	NS
White	89.8	80.6	84.4		
Asian	0.0	0.0	4.4		
Other	1.7	3.2	2.2		

Presented in Table 2 are the results of the chi-square analysis on the Treatment Choice Task for Parents.

Long-Lasting Side Effects: Significant differences between the clusters was evident at the less than .001 level. Specifically, 86.4% of parents in Cluster 1 reported that long-lasting side effects may make them regret the treatment choice. In Cluster 2,

64.5% reported that the side-effects would not make them regret the treatment choice. In Cluster 3, while the distribution was slightly more even, 46.7% of parents reported that long-lasting effects would significantly make them regret the treatment choice.

Short-Lasting Side Effects: Significant differences between the clusters were noted. In Cluster 1, 57.6% of parents reported they would not regret the treatment due to short-lasting side effects. In Cluster 2, 61.3% of parents said they would not regret the treatment due to short-lasting side effects. In Cluster 3, 44.4% of parents reported that short-lasting effects may make them regret the treatment choice.

Cost: There were significant differences between the clusters at the less than .001 level. In Cluster 1, 72.9% of parents indicated that they would pay $15 to $500 a month on long-term treatments. In Cluster 2, 71.0% of parents reported that they would pay $15 to $500 a month as well. In Cluster 3, 57.8% of parents reported that cost would not influence their choice of treatment for their child.

Insurance coverage: There were no significant differences between the clusters. In all three clusters, the majority of parents (i.e., 76.3% in Cluster 1, 64.5% in Cluster 2, and 71.1% in Cluster 3) reported that insurance coverage may influence their choice of treatment for their child.

Scientific Validity: There was no significant difference between the clusters. The majority of parents in all three clusters (i.e., 67.8% in Cluster 1, 87.1% in Cluster 2, and 64.4% in Cluster 3) reported that they would choose a treatment choice with high scientific validity.

Sessions with Provider: Significant differences between the clusters were found at the less than .001 level. In Cluster 1, 93.2% of parents and in Cluster 2 54.8% of parents wanted their child to have some sessions with the treatment provider. In Cluster 3, 48.7% of parents wanted weekly sessions with the provider.

Therapeutic Component: There was a significant difference between the clusters. Within Cluster 1, 84.7% of respondents would like there to be a therapeutic component to treatment but it is not a requirement. In Cluster 2, 54.8% of parents also would like a therapeutic component but is not required. In Cluster 3, 57.8% of parents require a therapeutic component to their child's treatment.

Immediate Changes: Results indicate a significant difference between the clusters. 78.0% of parents in Cluster 1 indicated that immediate changes are not important if there is assurance that their child's behavior will improve. In Cluster 2, 58.1% of parents reported that immediate changes in behavior are important. In Cluster 3, 80% of parents also reported that immediate changes are not important if there is assurance that their child's behavior will improve.

Continuation of Treatment: Significant differences were noted at the .05 significance level. Across all three Clusters, the majority of parents in each cluster (61.0 %, 38.7%, and 40.0%) reported that they do not want to continue treatment when symptoms are no longer observed.

Awareness of Condition: Results indicate significant differences between the group at the .001 level. In Cluster 1, 2, and 3, a majority of parents (76.3%, 93.5%, and

93.3% respectively) reported that they want their child's treatment to help their become aware of their condition of ADHD.

Medication Treatment: A significant difference between the clusters was present at the less than .001 level. In Cluster 1, 91.5% of parents reported that their child would likely receive a low dose of medication. In Cluster 2, 51.6% of parents indicated that their child would likely receive a high dose of medication. In Cluster 3, 68.9% of parents also reported that their child would likely receive a low dose of medication.

Brain-based Treatment: Results showed significant differences between the clusters at the less than .001 level. The majority of parents in Clusters 1 and 3, 66.1% and 55.6% respectively, reported that their child would likely complete some sessions of brain-based treatment. In Cluster 2, 71.0% of parents reported that their child would not attend brain-based treatment sessions.

Overall, the data shows certain characteristics of parents within each Cluster. Parents in Cluster 1 fell generally within the middle of the groups as they were more likely to have their child in treatment when compared to Cluster 3, but less likely than Cluster 2. Additionally, parents in Cluster 1 were not as likely to be diagnosed with ADHD than Cluster 2, but more likely than Cluster 3. Concerning side effects, parents in this cluster reported a possibility of regretting the treatment choice because of long-lasting side effects. However, when considering short-lasting side effects, differences were seen among the parents in Cluster 1, as the majority (56.7%) reported that they would not regret short-lasting symptoms, while a considerable number of parents (40.7%)

reported possibly regretting the treatment choice due to short-lasting side effects. Regarding costs, the majority of parents in Cluster 1 indicated being willing to spend $15 to $500 a month on long-term treatment. However, these parents also reported that insurance coverage would possibly influence their decision. Most parents in this cluster wanted some sessions with the treatment provider and for a therapeutic component to be included, but it is not required for their treatment of choice. Regarding immediate changes in behavior, parents in Cluster 1 indicated that immediate behavioral changes were not required if they had assurance of behavioral progress. The majority of parents in the sample reported that they would want their child to be able to discontinue treatment after symptoms are no longer present. Most parents in Cluster 1 wanted a treatment that will help their child be more aware of their ADHD symptoms. However, it is important to note that many parents (23.7%) in this cluster also indicated that this was not important to them. Regarding medication treatment, parents in Cluster 1 believed that their child may receive a low dose of medication (91.5%) and the majority reported being willing to have their child complete some sessions of brain-based treatment (66.1%). When compared to the other clusters, the responses of parents in Cluster 1 indicate a general openness to brain-based treatment. Therefore, parents in Cluster 1 are considered Brain-Based Parents.

Parents in Cluster 2 were the most likely to have their child in treatment for ADHD and were also the most likely to have been diagnosed with ADHD themselves. Regarding side effects, parents in this cluster were mostly not concerned with long-

lasting or short-lasting side effects. Parents in Cluster 2 reported being willing to spend $15 to $500 a month on treatment with the availability of insurance possibly influencing their treatment choice. Most parents in this cluster reported wanting some sessions with the treatment provider with a therapeutic component being welcomed but not seen as a requirement for their child's treatment. Parents in Cluster 2 reported that immediate changes in their child's behavior were an important factor in their decision. When considering continuation of treatment, although most parents reported that their child should not have to continue treatment after symptoms are no longer observed, many parents also reported that continuation of treatment was not an important factor for them. Parents in this cluster reported that it was important for their treatment choice to help their child understand his or her ADHD. Regarding medication, most parents in Cluster 2 indicated that their child may require a high dose of medication and that they would not receive brain-based treatment. Therefore, parents in Cluster 2 are Medication-Based Parents.

Parents in Cluster 3 were less likely to have been diagnosed with ADHD and more likely to not have their children in treatment. Furthermore, regarding side effects, parents in this cluster were more preoccupied with the side effects of treatments in general whether short- or long-term. Parents within this cluster were not as concerned with treatment cost, as they were more likely to not be influenced by cost of treatment. However, insurance coverage may influence their treatment choice. Cluster 3 parents seemed to be divided regarding sessions with the treatment provider, as they wanted

either weekly or some sessions with the provider. However, the majority of parents in this group reported that a therapeutic component to treatment was a requirement for their child. For parents in Cluster 3, immediate changes were not important if there was assurance of improvement in behavior once treatment started and most wanted the treatment to discontinue after behavior problems were no longer observed. Parents in Cluster 3 wanted their child's treatment to help their child become aware of their condition of ADHD and seemed to be open to the possibilities of medication treatment options and brain-based treatment. Therefore, parents in Cluster 3, are Open to both treatment options.

Table 2

Chi-Square Treatment Choice Task for Parents Results for Three-Cluster Solution

Variable	Cluster 1	Cluster 2	Cluster 3	X_2	*p*
Long-Lasting Side Effects				71.81	<.001
Long-lasting side effects my child may experience will not make me regret the treatment choice.	6.8	64.5	24.4		
The long-lasting side effects my child may experience may make me regret the treatment choice.	86.4	32.3	28.9		

Table 2 Continued…

Variable	Cluster 1	Cluster 2	Cluster 3	X_2	*p*
The long-lasting side effects my child may experience will make me significantly regret the treatment choice.	6.8	3.2	46.7		
Short-Lasting Side Effects				10.53	.032
The short-lasting side effects my child may experience will not make me regret the treatment choice.	57.6	61.3	42.2		
The short-lasting side effects my child may experience may make me regret the treatment choice.	40.7	38.7	44.4		
The short-lasting side effects my child may experience will make me significantly regret the treatment choice.	1.7	0.0	13.3		
Cost				18.86	<.001
I will spend $15 to $500 a month on long-term treatments.	72.9	71.0	33.3		
Cost will not influence my choice of treatment.	23.7	25.8	57.8		

Table 2 Continued…

Variable	Cluster 1	Cluster 2	Cluster 3	X_2	*p*
I will spend over $1200 a month on treatment if it is less than 6 months	3.4	3.2	8.9		
Insurance Coverage				7.76	NS
I will only use treatment options that are covered by insurance	15.3	16.1	4.4		
Insurance coverage may influence my choice	76.3	64.5	71.1		
Insurance coverage will not influence my choice.	8.5	19.4	24.4		
Scientific Validity				6.82	NS
Strong scientific validity	67.8	87.1	64.4		
Scientific validity may or may not influence my choice	32.2	12.9	33.3		
I will not care about scientific validity	0.0	0.0	2.2		
Sessions with Provider				59.60	<.001
Weekly sessions with provider	1.7	9.7	48.9		
Some sessions with provider	93.2	54.8	46.7		
Minimal sessions with provider	5.1	35.5	4.4		
Therapeutic Component				48.55	<.001
Does not matter if treatment has therapeutic component	5.1	32.3	8.9		

Table 2 Continued…

Variable	Cluster 1	Cluster 2	Cluster 3	X_2	*p*
Would like it included but not required	84.7	54.8	33.3		
Therapeutic component required	10.2	12.9	57.8		
Immediate Changes				25.52	<.001
Immediate changes in behavior are important	20.3	58.1	11.1		
Immediate changes are not important if there is reassurance of behavior changes	78.0	38.7	80.0		
Immediate changes in behavior are not important	1.7	3.2	8.9		
Continuation of Treatment				10.14	.038
No more treatment when symptoms are no longer observed	61.0	38.7	40.0		
Not important if treatment continues after symptoms are no longer observed	30.5	32.3	31.1		
Important to continue to need treatment	8.5	29.0	28.9		
Awareness of Condition				17.72	.001
Treatment to keep child unaware of condition	0.0	6.5	2.2		

Table 2 Continued…

Variable	Cluster 1	Cluster 2	Cluster 3	X_2	p
Not important for child to be aware of condition	23.7	0.0	4.4		
Treatment to help child be aware of condition	76.3	93.5	93.3		
Medication Treatment				56.64	<.001
No medication	1.7	0.0	26.7		
Low dose of medication	91.5	48.4	68.9		
High dose of medication	6.8	51.6	4.4		
Brain-based Treatment				27.80	<.001
No brain-based treatment	2.8	71.0	24.4		
Some sessions of brain-based treatment	66.1	29.0	55.6		
40 sessions of brain-based treatment	5.1	0.0	20.0		

A one-way ANOVA was conducted to study Hypothesis three, which states that parents who score higher on the AKOS, and therefore have more knowledge of ADHD, are more likely to be medication avoidant. However, as shown on Table 3, there were no significant differences between the clusters, indicating that knowledge of ADHD does not influence parent treatment choice. Therefore, given that the results of this one-way ANOVA were not significant, this study will explore the differences between each individual AKOS question and the three-cluster solution.

Table 3

Results of One-Way ANOVA on AKOS Total Score and the Three-Cluster Solution

Variable	Mean	SD	*F* ratio	*p*
Cluster 1	42.21	3.99	--	--
Cluster 2	41.23	4.01	--	--
Cluster 3	42.95	4.39	--	--
AKOS Total	42.22	4.15	1.58	.221

A second Chi-Square analysis (Table 4) was completed on each question of the AKOS and the three-cluster solution to better understand how parents' responses on the AKOS were presented within the clusters. The AKOS question 1 was significant at the .05 level. Parents in Cluster 1 (i.e., Brain-Based Parents) and Cluster 2 (i.e., Medication-Based Parents) believed that most children with ADHD continue to have difficulties with attention when they become teenagers. However, most parents in Cluster 3 (i.e., Open Parents) indicated that the statement was false. Question 10 addresses how medication would impact school performance. Results indicate a significant difference at the .05 level. The Brain-Based Parents and Medication-Based Parents believed the statement was true, while the Open parents mostly believed it was false. AKOS question 12 states that psychological treatments are not as effective as medication in reducing symptoms. Similar to the results stated above, Brain-Based and Medication-Based parents mostly agreed that the statement was true, while the majority of Open Parents indicated that the statement was false. Significance was at the .01 level. However, it is important to note

that almost half of the parents in the Brain-Based cluster believe that this statement is false. The last question to have significant differences between the clusters, AKOS question 13, states that medication is not as beneficial after children become adolescents and adults. Although the majority of parents in all three clusters responded that this statement is false, there are significant differences within the clusters. Specifically, all parents in the Medication-Based cluster indicated that the statement is false. However, responses in Brain-Based and Open clusters were more diverse.

Table 4

Chi-Square Attention-Deficit/Hyperactivity Disorder Knowledge Scale (AKOS) Results for the Three-Cluster Solution

Variable	Cluster 1 T/F	Cluster 2 T/F	Cluster 3 T/F	X_2	*p*
AKOS 1: Most children with ADHD have problems with attention when they become teenagers.	64.4/35.6	64.5/35.5	42.2/57.8	6.05	.049
AKOS 2: Children with ADHD can be OK in some situations and be distractible and disruptive in others.	79.7/20.3	96.8/3.2	84.4/15.6	4.76	NS
AKOS 3: Special diets, like the Feingold diet, have been scientifically proven to improve the symptoms of most people with ADHD.	17.2/82.8	25.8/74.2	20.5/79.5	.92	NS
AKOS 4: Medical tests given in a psychologists' office are necessary for making the diagnosis of ADHD.	54.2/45.8	35.5/64.5	53.3/46.7	3.23	NS

Table 4 Continued…

Variable	Cluster 1 T/F	Cluster 2 T/F	Cluster 3 T/F	X_2	p
AKOS 5: Medication often reduces a child's tendency to be aggressive with others at school.	66.7/33.3	83.9/16.1	57.8/42.2	5.76	NS
AKOS 6: ADHD may sometimes be inherited.	93.2/6.8	93.5/6.5	100.0/0.0	3.14	NS
AKOS 7: Almost all children with ADHD meet national and state standard for learning disabilities.	30.5/69.5	22.3/77.4	24.4/75.6	.82	NS
AKOS 8: Boys and girls have similar rates of ADHD.	25.4/74.6	29.0/71.0	15.6/84.4	2.24	NS
AKOS 9: Children with ADHD are usually brighter than those without ADHD.	47.5/52.5	35.5/64.5	46.7/53.3	1.32	NS
AKOS 10: In most cases, medication will help a child achieve better grades in school.	64.4/35.6	77.4/22.6	48.9/51.1	6.57	.037

Table 4 Continued…

Variable	Cluster 1 T/F	Cluster 2 T/F	Cluster 3 T/F	X_2	p
AKOS 11: There is a medical test that is very effective in identifying children with ADHD.	17.2/82.8	29.0/71.0	20.0/80.0	1.73	NS
AKOS 12: For most children with ADHD, psychological treatments are not as effective as medication in improving attention and reducing disruptive behaviors.	50.8/49.2	71.0/29.0	35.6/64.4	9.22	.010
AKOS 13: The medication(s) used to treat ADHD are of little benefit when children reach adolescence or adulthood.	5.1/94.9	0.0/100.0	15.6/84.4	7.30	.026
AKOS 14: There is reliable evidence that ADHD is often caused by having too much sugar in a child's diet.	3.4/96.6	0.0/100.0	4.4/95.6	3.69	NS

Table 4 Continued…

Variable	Cluster 1 T/F	Cluster 2 T/F	Cluster 3 T/F	X_2	p
AKOS 15: Children who are hyperactive at the age of 3 almost always become identified as having ADHD by the age of 7.	15.3/84.7	3.2/96.8	15.9/84.1	3.27	NS
AKOS 16: There are new medications available that are more effective and safer than previous medications such as Ritalin.	71.2/28.8	71.0/29.0	82.2/17.8	1.97	NS
AKOS 17: The diagnosis of ADHD can be made if symptoms first develop at the age of 10.	44.1/55.9	38.7/61.3	26.7/73.3	3.36	NS

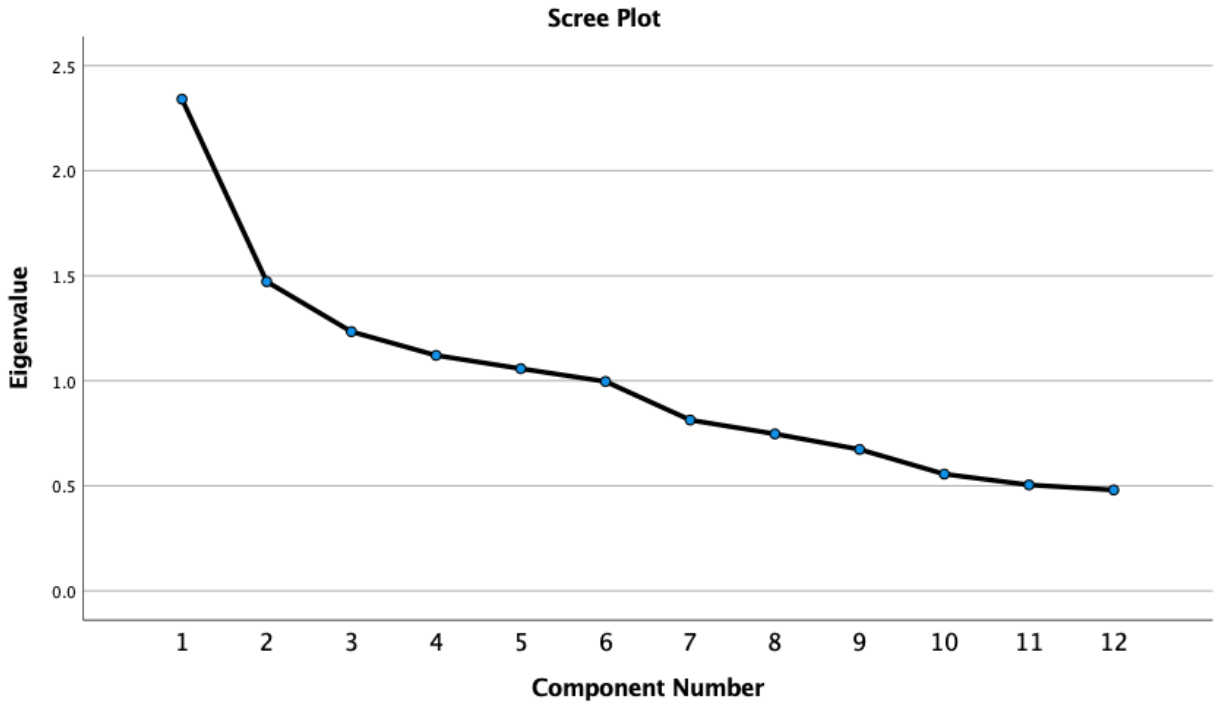
Factor Analysis

A Principal components analysis was conducted on the Treatment Choice Task for Parents. On the basis of the scree test (Figure 1) and the percentage of variance accounted for by each factor, a five-factor solution was found to be most appropriate. Component 1 accounted for a total of 15.53% of the variance, component 2 accounted for a total of 12.19% of the variance, component 3 accounted for a total of 11.79% of the variance, component 4 accounted for a total of 11.42% of the variance, and component 5 accounted for a total of 9.29% of the variance. A value for loadings of .40 was used as a cut off for items that did not relate to a component. All 12 items loaded on these five components with item 12 loading on components 4 and 5 (Table 5). Component 1 was interpreted to represent specific treatment components, Component 2 was interpreted to represent side effects, Component 3 was interpreted to represent general costs to the family, Component 4 was interpreted to represent scientific validity and treatment choice, and Component 5 was interpreted to represent awareness of condition. Results of the factor analysis, as seen on Table 5, supported the differentiation of each individual question on the Treatment Choice Task for Parents, meaning that each question measured different factors that can influence a parent's choice in treatment for their child. For further interpretation of the five factors, a Bartlett's test (Table 7) indicated statistical significance at the less than .001 level indicating that the data is suitable for a data reduction technique. A Varimax rotation was used (Table 8) to evaluate potential

correlations between the TCT-P items. Correlations were found among the items pertaining to each factor.

Figure 1

Visual Results of Scree Test



Note. The scree plot presented indicates the number of factors to be use in the principal component analysis. The cut off to determine the factors must be an Eigenvalue above 1.0. Therefore, five factors will be used.

Table 5

Results of Confirmatory Factor Analysis of the 12-Item TCT-P

Item	R^2	Factor
LT SE	.737	2
ST SE	.855	2

Table 5 Continued…

Cost	.809	3
Insurance Coverage	.734	3
Sci. Validity	.780	4
Sessions	-.678	1
Therapeutic Comp.	.701	1
Immediate Changes	.630	1
Conti. Of Treatment	.494	1
Awareness of Cond.	.899	5
Medication	-.582	4
Brain-Based	.535/-.463	4/5

Note. The Confirmatory Factor Analysis is used to determine which factor each item corresponds to. LT SE = Long-Term Side Effects; ST SE = Short-Term Side Effects

Table 6

Component Transformation Matrix

Factor	1	2	3	4	5
1	.74	.42	.28	.45	.03
2	-.49	.48	.68	-.10	.25
3	-.06	-.63	.59	.35	-.35
4	.46	-.32	.32	-.67	.37
5	.11	.29	.11	-.46	-.82

Note. 1=Treatment components; 2=Side effects; 3=Costs; 4=Scientific validity and treatment choice; 5=Awareness of condition

Table 7

Bartlett's Test

Model X^2	246.00***
DF	66

Note. ***p<.001

Table 8

Relationship Between Items in the TCT-P

TCT-P Items		1	2	3	4	5	6	7	8	9	10	11	12
1	LT SE	-											
2	ST SE	.36	-										
3	Cost	.08	.01**	-									
4	Insurance Coverage	.16	.10	.32	-								
5	Sci. Validity	.06	.00**	-.06	.10	-							
6	Sessions	-.18	-.07	-.05*	.04*	-.10	-						
7	Therapeutic Comp.	.22	.13	.12	-.01**	.04*	-.40	-					
8	Immediate Changes	.20	.00**	.10	.10	.03*	-.28	.24	-				
9	Conti. Of Treatment	-.03*	.05*	-.07	-.09	.06	-.14	.14	.15	-			
10	Awareness of Cond.	.07	.00**	.03*	.02*	.05*	-.07	.10	.07	-.00**	-		
11	Medication	-.35	-.13	-.21	-.03*	-.18	.22	-.21	-.14	.07	-.09	-	
12	Brain-Based	.10	-.10	.07	.01**	.20	-.19	.27	.15	.13	-.15	-.23	-

Note. LT SE = Long-Term Side Effects; ST SE = Short-Term Side Effects

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed)

Chapter V

Discussion

The present study sought to investigate the factors that influence parent treatment choice for their children with ADHD when given choices between brain-based treatment options or medication-based treatment. The study also addresses parents' views on the viability of brain-based treatment. Furthermore, it aims to give clarity to clinicians on their clients' potential choices and the variables influencing their choices, in order to better market to and reach parents that are interested in or open to brain-based treatments for their children.

The study investigated three hypotheses; 1) When compared to brain-based treatment, parents will be predominantly medication oriented due to its low cost, ease of administration, and their child's quicker response to treatment; 2) Based on the findings by Waschbusch et al. (2011), although insignificant, a large number of parents will fall in the brain-based oriented group due to a high number of parents that are against the use of medication for their child's ADHD; and 3) Parents who score higher on the AKOS-R (i.e., have more knowledge of ADHD) will be more likely to be medication avoidant.

The results did not support hypothesis one. Medication-Based Parents (i.e., Cluster 2) were the smallest cluster, accounting for 22.96% of the sample, with Brain-Based Parents (i.e., Cluster 1) being the largest cluster accounting for 43.70% of the

sample. The results of the autoclustering analysis indicated that the data is best represented in three clusters. The third cluster (i.e., Cluster 3) aligns with a group of parents whose responses were more diverse and spread throughout the three answer options given in each item of The ADHD Treatment Choice Task for Parents. These parents were deemed as Open to both treatment options.

Results supported hypothesis two as a large, although insignificant, number of the sample fell within the Brain-Based Parent cluster, given that it was largest cluster in the sample. Statistically significant differences between the clusters and the responses to The ADHD Treatment Choice Task for Parents were noted in instances when parents considered the long-lasting and short-lasting side effects, the cost, sessions with the treatment provider, the inclusion of a therapeutic component in treatment, immediate changes in their child's behavior, the continuation of treatment after the symptoms subsided, and the inclusion of education of their child's condition in the treatment.

Results did not support hypothesis 3, as no significant differences were found between a parent's total AKOS score and their treatment preference. These results indicate that a parent having knowledge of ADHD does not necessarily influence their treatment choice, suggesting that parents' choices of treatment for their children are best explained by factors such as cost, side effects, and specific treatment components that will have a direct impact on their family's lives. Although hypothesis 3 was not supported, further analysis of the individual AKOS questions with the three-cluster solution found results worth discussing. Specifically, significant differences were found

between the clusters when related to questions about the continued experiences of symptoms into adolescences and adulthood; the impact of medication on educational performance and behavioral symptoms; and the benefit of medication use from childhood into adolescence and adulthood. The results of this analysis closely aligned with the cluster descriptions of Brain-Based Parents, Medication-Based Parents, and Open Parents from the analysis of The ADHD Treatment Choice Task for Parents. When compared to Medication-Based Parents, responses from Brain-Based Parents were generally of the belief that medication was not as helpful, although it is important to note that most parents within the brain-based cluster were still in favor of medications (i.e., gave a "True" response). Similar to the results of The ADHD Treatment Choice Task for Parents, the Open Parents' responses on the AKOS were much more evenly distributed between the answer choices of True or False.

Studies evaluating parent preferences of treatment components for their children with ADHD have begun to show the importance of parent participation, parent buy-in, and how they can aid in treatment adherence and effectiveness. Results of this study are comparable to Wymbs et al. (2016) who evaluated the parent preferences of parent training format. The majority of their sample indicated that they preferred a training format that would help them better understand their child and their problems with ADHD. Similarly, in the present study, the majority of parents fell in the Brain-Based cluster, indicating that they were most interested in a treatment option that provided them with at least some sessions that include a therapeutic component, as well as child-focused

education of ADHD. The present study also had a group of parents whose responses fell in a middle ground where their choices were not more specifically aligned with one treatment option over the other. The Open parents in the present study where in contrast to the study conducted by Wymbs et al., as the Minimal Information parents in their study were more closed off to parent trainings. The Open parents in this study reveal that there are groups of parents who are more open to treatment options when considering specific treatment components and how they fit with the family's lifestyle in conjunction with treatment outcomes.

This study is also comparable to the results of Fegert et al., (2011) who found regarding medication treatment, parents were most interested in a treatment where effectiveness lasted all-day and improved their child's emotional and social functioning. The present study's results further elaborate on Fegert et al., findings, as the results were able to differentiate between the type of parents who may respond in this fashion. Differentiating parents into groups can help practitioners address parent concerns, better target education, and tailor treatments to fit the family's needs. As a result, this would help improve both treatment buy-in and adherence, leading to a higher likelihood of treatment success.

A study by Corkum et al. (1999) assessed how parent knowledge of ADHD and their opinions of treatment affected their enrollment and adherence to medication-based and behavior-based treatments. Parents were given a modified version of the AKOS and then decided to participate in the 12-month randomized trial of medication or placebo and

parent training groups or parent support groups. The researchers monitored treatment enrollment and adherence over the 12-month period. Those remaining in the study at the end of the 12-month period were given another modified AKOS. Results showed that when analyzing opinions, parents were more open to nonpharmacological treatments than pharmacological treatments; a higher score on the AKOS was correlated with more positive opinions of behavioral-based treatments versus medication-based; and higher AKOS scores were correlated with enrollment of treatment, adherence to medication or behavioral-based treatment, and was not related to knowledge of ADHD or opinions of treatment. Furthermore, after completion of the 12-month treatment trial, parent AKOS scores increased, indicating more knowledge of ADHD. Similar to Corkum et al., in the present study, knowledge of ADHD did not have a significant impact of parent treatment choice. However, Corkum et al. found that parent knowledge of ADHD does affect treatment enrollment and adherence to the treatment.

The present study used methods similar to the study conducted by Waschbusch et al., (2011). The researchers used a discrete choice task with descriptions of treatments and parents chose the treatment they would be mostly likely to choose for their child with ADHD. Results of the Waschbusch et al. study presented two groups of parents, Medication Avoidant and Outcome Oriented parents. The present study also found that parents' treatment choices and the factors that influenced their choices can categorize parents into descriptive groups. Furthermore, the present study also determined that when presented with treatment information and given options, parents were largely predicted to

choose treatments that focus more on behavioral modification or a combination of behavioral intervention and medications instead of strictly medication-based treatment.

When considering brain-based treatments, parent perceptions and their expectations also play an important role. A study conducted by deBeus and Kaiser (2011) hypothesized that children in a neurofeedback treatment group would experience ADHD symptoms improved, as measured by parent and teacher rating scales and formal ADHD assessments using the IVA CPT, when compared to a placebo group. Results indicated that teacher reports showed improvement in behavior after the neurofeedback treatment. However, there were no changes in parent ratings between the treatment and placebo groups. This indicates that parents in the placebo and the neurofeedback treatment conditions, both, rated their child as improving. deBeus and Kaiser attributed this finding to an expectancy bias. This highlights the significant role that a parent's perception plays in the treatment of their child's symptoms. This study also shows that parental expectations can influence a parent's perception of how effective the treatment is.

Recent clinical practice guidelines as described by Shah et al. (2019), include the need to evaluate parents' perceptions concerning treatment, consider their treatment preferences, and consider the family's current circumstance and resources in order to recommend a treatment that best fits their needs, resources, and lifestyle. They stress the importance of a "therapeutic alliance," which is done by holding positive regard and respect for parents' and families' opinions and concerns about certain treatments. Shah and colleagues also address the importance of psychoeducation with parents and their

children. They recommend an average of two to three sessions of psychoeducation that are also individualized for the family being served. Specifically, they state that clinicians should focus on providing detailed information on the core symptoms of ADHD and the etiological factors of ADHD such as genetic and environment components. They also recommend addressing parental guilt or shame; prevalent misconceptions of ADHD; descriptions of pharmacological and nonpharmacological treatment options along with their risks and benefits, and possible outcomes if treatment is sought or if treatment is either rejected or inconsistent; and the effect of comorbid disorders if present in the child. When considering brain-based treatments, many of these topics are addressed in the multiple sessions with the treatment provider. Clinical practice guidelines were proposed by Micoulaud-Franchi et al. (2015). In their review, they suggest that, although optimum spacing has not yet been defined, N.F. is usually completed in 20-30 sessions, once to three times per week. They also note the importance of continued discussions with the patient, and for the purposes of this present study, discussions with the family and child. These discussions should include detailed descriptions of the treatment session before starting, information to sustain motivation during the session, and an explanation of what to expect after session completion. These proposed practice guidelines for neurofeedback therapy allow for optimal therapeutic relationship and rapport building, psychoeducation, and continued communication with parents and children about how the treatment is progressing toward their goals, any proposed changes, and overall opinions of treatment options. The development of clinical guidelines in the field of N.F. is critical to its

perceived and actual effectiveness; and would, in turn, improve parent buy-in for N.F. as a treatment option for their children. Furthermore, implementation of set guidelines can aid in N.F. becoming more widely accessible through more reasonable costs and insurance coverage, which as noted in the present study cost has a significant influence on parents' treatment choices.

This study highlights that when offered information on treatment choices, parents are more influenced by treatment components, costs, therapeutic sessions, education of ADHD, and behavioral modification than they are by their knowledge of ADHD. This is of use to clinicians building a brain-based treatment practice for the purposes of marketing their treatment, gauging parents' openness to and/or interest in brain-based treatments, and understanding the specifics driving treatment choice by parents. Clinicians can use the information from the present study to educate parents on brain-based treatments and find methods to increase the scientific validity of N.F., increase access to insurance coverage, and provided more affordable treatment options to parents for their children with ADHD.

Throughout the course of the study, parent participants expressed concerns with the survey. Some parents reported starting the survey but not finishing as they believed that the survey forced answers between two choices (specifically in reference to the AKOS.) Other parents reported that the wording was either confusing or strongly biased toward brain-based treatment. Comments from parents suggest that when answering the survey questions, parents did so in reference to their children's' current course of

treatment, rather than the treatment options described in the survey itself (as designed). For example, one parent had difficulty answering questions because their child is currently receiving both behavioral and medication treatment and they could not make an appropriate choice. These concerns from parents indicates that both the AKOS and Treatment Choice Task for Parents should be heavily reviewed and modified to limit perceived and actual bias and to clarify instructions on how the survey should be completed (i.e., parents are to consider choice options based on the treatments described in the survey, and not based off of treatments their child currently receives). Regarding bias, this study may have been influenced by researcher bias, as the primary investigators have had extensive experience in the research and clinical use of brain-based treatment techniques. The descriptions may also present a more positive description of neurofeedback than is warranted. As reported by Micoulaud-Franchi et al (2015), neurofeedback has not been deemed a therapy that can be used, solely, to treat mental and brain disorders, but rather in conjunction with other treatments. While they note that promising results have been found in controlled, randomized, and blinded studies; a plethora of studies with faulty neurofeedback protocols, lack of appropriate comparison groups, and lack of control and randomization have made it difficult to study its true effectiveness. Furthermore, the present study did not document important demographic information from parents concerning their child's ADHD (e.g., how long they have carried the diagnosis). Information on their child's current treatment, such as whether they are receiving medication treatment, if so, what type of medication is being used, was

not collected. Information from parents on their previous experiences with ADHD treatments whether behavioral or pharmacological were also not included in the demographic's questionnaire.

Replication of this study is recommended. Stronger measures should be implemented to accurately evaluate how parent treatment preferences can affect treatment efficacy, and to assess parents' opinions on the feasibility of brain-based treatments. Due to the frustration parents experienced as they completed the choice task, future studies should consider including a statement that instructs parents to choose their preferences based, solely, on the treatment options in the survey, rather than comparing to their child's current treatment. Future studies should also evaluate the efficacy of using the AKOS, as it may not be an accurate representation of an individual's knowledge of ADHD. This study recommends that the AKOS be revised or updated to include most up-to-date best practices and clinical information. The ADHD Treatment Choice Task for Parents should also be considered for further revisions to ensure an unbiased measure.

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Appendix A

List of Social Media Parent Groups Used for Survey Distribution

ADDitude – ADHD Support Group for Parents

ADHD/ADD Parent Support Group

ADHD Parent Support

Support Group For Parents Of Kids With ADHD, ODD And Other Behavioral Issue

ADHD Texas Kids Support Group For Parents

Moms With ADHD/ADD Kids

ADHD Parent Nutrition Support Group

Appendix B

Totals and Percentage Values for Final Sample

Table 1

Descriptive Statistics for the Final Sample (N = 137)

Variable	N	%
Gender		
Female	134	97.8%
Male	3	2.2%
Highest Degree Completed		
Highschool Diploma/GED	13	9.5%
Associate degree	18	13.1%
Bachelor's Degree	49	35.8%
Master's Degree	38	27.7%
Doctorate/Other Advanced Degree	19	13.9%
Ethnicity		
White	118	86.1%
Latinx	11	8.0%
Black	3	2.2%
Asian	2	1.5%
Other	3	2.2%
Formally Diagnosed with ADHD	23	16.8%
Child receiving treatment for ADHD	113	82.5%
Parent Age Range	21-59	--

Appendix C

ADHD Treatment Choice Task for Parents

Descriptions of Treatment Components Presented to Parents

Treatment 1: Medication

Description: There are multiple medication options for the treatment of ADHD. The two main types are stimulant and non-stimulant medications. Stimulant medications can be classified in two groups, methylphenidates and amphetamines. Non-stimulant medications are classified as tricyclic antidepressants, non-tricyclic antidepressants, specific norepinephrine reuptake inhibitors, and non-schedule stimulants.

Possible Outcomes: According to many research studies and clinical trials, medication use for management of ADHD symptoms can decrease hyperactivity and impulsivity and increased focus and concentration for an extended period of time. The decrease of symptoms can lead to improvements in academic, occupational, and social performance.

Side Effects: For some individuals medication side effects can be troubling and long lasting. The most common side effects of stimulant medications include difficulty falling asleep, decrease in appetite, headaches, stomach aches, irritability or a sudden or more severe presentation of ADHD symptoms. The most common side effects of non-stimulant medication are mild sleepiness and/or headaches and an increase in hyperactivity.

Cost: Most medications are available in generic or name brand form. Depending on the form chosen, medications can range in monthly costs between $15 to $500 given that most insurance covers this type of treatment. Medication management typically requires that the individual use medications for many years.

Treatment Option 2: Brain-Based Treatment

Description: Research has shown emerging but promising results on the use of brain-based treatment for ADHD. Neurofeedback is one widely researched technique that consists of training pre-determined brain-wave frequencies using visual or auditory rewards. A cap is placed on the head which measures electrical frequencies in the brain and displays the frequencies on a software program.

Possible Outcomes: Brain-based treatment of ADHD, such as Neurofeedback, are considered "experimental." Some research has suggested that this technique can create long lasting changes in the brain that help the individual manage impulses and increase attention and focus, which can positively influence academic, occupational, and social performance. Techniques such as Neurofeedback have also been found to increase sleep quality and mood stability.

Side Effects: The most common side effects of brain-based treatment are mild and only last for few hours after each session; these include, headaches, dizziness, and redness at the site of the electrodes.

Cost: Most insurance providers do not cover the cost of brain-based treatments such as Neurofeedback. The cost of Neurofeedback, per session, can range from $100 to

$300, about $1200 monthly. Neurofeedback is usually not covered by insurance. Brain-based therapy sessions are not a life-long treatment option. Most clients are able to stop treatment after 40 sessions or after 5 months but may need "booster" sessions every few months after the completion on treatment.

Figure 1

The ADHD Treatment Choice Task for Parents

Side effects:

Long-lasting side effects (i.e., loss of appetite, headaches, irritability) my child may experience will not make me regret the treatment choice.	**The long-lasting side effects (i.e., loss of appetite, headaches, irritability) my child may experience may make me regret the treatment choice.**	**The long-lasting side effects (i.e., loss of appetite, headaches, irritability) my child may experience will make me significantly regret the treatment choice.**

The short-lasting side effects (i.e., headaches, dizziness, redness at electrode site) my child may experience will not make me regret the treatment choice.	**The short-lasting side effects (i.e., headaches, dizziness, redness at electrode site) my child may experience may make me regret the treatment choice.**	**The short-lasting side effects (i.e., headaches, dizziness, redness at electrode site) my child may experience will make me significantly regret the treatment choice.**

Costs:

I will spend $15 to $500 a month on long-term treatments for my child.	**Cost will not influence my choice of treatment for my child.**	**I will spend over $1200 a month as long as the treatment does not last longer than 6 months.**

I will only use a treatment option for my child that is covered by my insurance.	**Insurance coverage may influence my choice of treatment.**	**Insurance coverage will not influence my choice of treatment.**

Scientific Validity:

I will only use a treatment option for my child that has strong scientific evidence.	**Scientific evidence may or may not influence my choice of treatment.**	**I will not care about scientific evidence.**

Treatment Sessions:

I would like my child's treatment to require weekly sessions with the provider.	**I would like the treatment to have some sessions with the provider, but it is not required.**	**I would prefer a treatment with minimal sessions with the provider.**

Therapeutic Component:

It does not matter if my child's treatment includes a therapeutic component.	**I would like my child's treatment to include a therapeutic component, but it is not required.**	**My child's treatment must include a therapeutic component.**

Immediate Changes:

It is important that my child will experience immediate changes in behavior after starting treatment.	**It is NOT important that my child will experience immediate changes in behavior after starting treatment, as long as I get assurance that benefits will come later.**	**It is NOT important that my child will experience immediate changes in behavior after starting treatment.**

Continuation of Treatment:

When symptoms are no longer observed, it is important that my child will not continue treatment (other than some booster sessions).	**When symptoms are no longer observed, it is NOT important if my child continues to need treatment.**	**When symptoms are no longer observed, it is important that my child continue to need treatment regularly for many years.**

Child Awareness:		
It is important that I choose a treatment that keeps my child unaware of his/her condition.	**It is not important if my child is aware of his/her condition.**	**It is important that I choose a treatment that helps my child be aware of his/her condition.**

Treatment components:

My child will not get medication.	**My child will get a low dose of medication.**	**My child will get a high dose of medication.**

My child will not attend brain-based treatment sessions.	**My child will attend some sessions of brain-based treatment.**	**My child will attend 40 sessions of brain-based treatment.**

My child will not attend behavioral therapy sessions	**My child will attend some sessions of behavioral therapy**	**My child will regularly attend sessions of behavioral therapy.**

Figure 2

ADHD Knowledge and Opinion Survey

AKOS-R

Below is a series of true-false statements. Click True if you believe the state is true or correct. Click False is you think the statement is false or incorrect.
Note: Please do not search for information on these questions. It is very important to get your current understanding.

1. Most children with ADHD have problems with attention when they become teenagers	T	F
2. Children with ADHD can be OK in some situations (such as at home) and can be distractible and disruptive in others (such as at school).	T	F
3. Special diets, like the Feingold diet, have been scientifically proven to improve the symptoms of most people with ADHD.	T	F
4. Medical tests given in a psychologists' office are necessary for making the diagnosis of ADHD	T	F
5. Medication often reduces a child's tendency to be aggressive with others at school.	T	F
6. ADHD may sometimes be inherited (passed along in the family).	T	F
7. Almost all children with ADHD meet national and state standard for learning disabilities.	T	F
8. Boys and girls have similar rates of ADHD	T	F
9. Children with ADHD are usually brighter than those without ADHD	T	F
10. In most cases, medication will help a child achieve better grades in school	T	F
11. There is a medical test that is very effective in identifying children with ADHD.	T	F
12. For most children with ADHD, psychological treatments are not as effective as medication in improving attention and reducing disruptive behaviors.	T	F
13. The medication(s) used to treat ADHD are of little benefit when children reach adolescence or adulthood.	T	F
14. There is reliable evidence that ADHD is often caused by having too much sugar in a child's diet.	T	F

15. Children who are hyperactive at the age of 3 almost always become identified as having ADHD by the age of 7.	T	F
16. There are new medications available that are more effective and safer than previous medications such as Ritalin	T	F
17. The diagnoses of ADHD can be made is symptoms first develop at the age of 10.	T	F

Appendix D

Results of Pilot Study on the TCT-P

Table 1

Results of Pilot Study on The ADHD Treatment Choice Task for Parents

Percentage of pilot participants responses	
Choice Item	Percentage
Side Effects	
The long-lasting side effects (i.e., loss of appetite, headaches, irritability) my child may experience may make me significantly regret the treatment choice.	90%
The long-lasting side effects (i.e., loss of appetite, headaches, irritability) my child may experience may make me regret the treatment choice.	10%
The short-lasting side effects (i.e., headaches, dizziness, redness at electrode site) my child may experience will make me significantly regret the treatment choice.	30%
The short-lasting side effects (i.e., headaches, dizziness, redness at electrode site) my child may experience may make me regret the treatment choice.	60%
The short-lasting side effects (i.e., headaches, dizziness, redness at electrode site) my child may experience will not make me regret the treatment choice.	10%

Table 1 Continued…

Cost/Insurance Coverage	
I will spend over $1200 a month as long as the treatment does not last longer than 6 months.	10%
Cost will not influence my choice of treatment for my child.	40%
I will spend $15 to $500 a month on long-term treatments for my child.	50%
Insurance coverage will not influence my choice of treatment.	30%
Insurance coverage may influence my choice of treatment.	70%
Scientific Validity	
Scientific evidence may or may not influence my choice of treatment.	10%
I will only use a treatment option for my child that has strong scientific evidence.	90%
Treatment Sessions	
I would prefer a treatment with minimal sessions with the provider	30
I would like my child's treatment to require weekly sessions with the provider.	30%
I would like the treatment to have some sessions with the provider, but it is not required.	40%
Therapeutic Component	
It does not matter if my child's treatment includes a therapeutic component.	20%
My child's treatment must include a therapeutic component.	20%
I would like my child's treatment to include a therapeutic component, but it is not required.	60%
Immediate Changes	
It is NOT important that my child will experience immediate changes in behavior after starting treatment.	20%

Table 1 Continued…

It is NOT important that my child will experience immediate changes in behavior after starting treatment, as long as I get assurance that benefits will come later.	80%
Continuation of Treatment	
When symptoms are no longer observed, it is NOT important if my child continues to need treatment.	22.2%
When symptoms are no longer observed, it is important that my child continue to need treatment regularly for many years.	33.3%
When symptoms are no longer observed, it is important that my child will not continue treatment (other than some booster sessions).	44.4%
Child Awareness	
It is not important if my child is aware of his/her condition.	10%
It is important that I choose a treatment that helps my child be aware of his/her condition.	90%
Treatment Component	
My child will not get medication.	22.2%
My child will get a low dose of medication.	77.7%
My child will attend 40 sessions of brain-based treatment.	22.2%
My child will attend some sessions of brain-based treatment.	77.7%

Appendix E

Chi-Square Results for the Four Cluster Solution

Table 1

Chi-Square Treatment Choice Task for Parents Results for Four Cluster Solution

Variable	Cluster 1 N=42	Cluster 2 N=28	Cluster 3 N=23	Cluster 4 N=42	X_2	*p*
Long-Lasting Side Effects					65.95	<.001
Long-lasting side effects my child may experience will not make me regret the treatment choice.	14.3	57.1	47.8	4.8		
The long-lasting side effects my child may experience may make me regret the treatment choice.	83.3	0.0	47.8	66.7		

Table 1 Continued…

Variable	Cluster 1 N=42	Cluster 2 N=28	Cluster 3 N=23	Cluster 4 N=42	X_2	*p*
The long-lasting side effects my child may experience will make me significantly regret the treatment choice.	2.4	42.9	4.3	28.6		
Short-Lasting Side Effects					53.73	<.001
The short-lasting side effects my child may experience will not make me regret the treatment choice.	78.6	75.0	34.8	23.8		
The short-lasting side effects my child may experience may make me regret the treatment choice.	19.0	7.1	65.2	73.8		
The short-lasting side effects my child may experience will make me significantly regret the treatment choice.	2.4	17.9	0.0	2.4		

Table 1 Continued…

Variable	Cluster 1 N=42	Cluster 2 N=28	Cluster 3 N=23	Cluster 4 N=42	X_2	*p*
Cost					58.66	<.001
I will spend $15 to $500 a month on long-term treatments.	76.2	0.0	95.7	61.9		
Cost will not influence my choice of treatment.	21.4	85.7	4.3	33.3		
I will spend over $1200 a month on treatment if it is less than 6 months	2.4	14.3	0.0	4.8		
Insurance Coverage					20.77	.002
I will only use treatment options that are covered by insurance	23.8	0.0	17.4	4.8		
Insurance coverage may influence my choice	64.3	64.3	69.6	85.7		
Insurance coverage will not influence my choice.	11.9	35.7	13.0	9.5		
Scientific Validity					9.21	NS

Table 1 Continued…

Variable	Cluster 1 N=42	Cluster 2 N=28	Cluster 3 N=23	Cluster 4 N=42	X_2	*p*
Strong scientific validity	78.6	78.6	69.6	59.5		
Scientific validity may or may not influence my choice	21.4	17.9	30.4	40.5		
I will not care about scientific validity	0.0	3.6	0.0	0.0		
Sessions with Provider					26.79	<.001
Weekly sessions with provider	4.8	17.9	13.0	38.1		
Some sessions with provider	90.5	67.9	56.5	57.8		
Minimal sessions with provider	4.8	14.3	30.4	7.1		
Therapeutic Component					54.69	<.001
Does not matter if treatment has therapeutic component	0.0	14.3	39.1	9.5		
Would like it included but not required	95.2	53.6	52.2	35.7		
Therapeutic component required	4.8	32.1	8.7	54.8		
Immediate Changes					35.24	<.001

Table 1 Continued…

Variable	Cluster 1 N=42	Cluster 2 N=28	Cluster 3 N=23	Cluster 4 N=42	X_2	*p*
Immediate changes in behavior are important	26.2	32.1	65.2	0.0		
Immediate changes are not important if there is reassurance of behavior changes	71.4	60.7	30.4	95.2		
Immediate changes in behavior are not important	2.4	7.1	4.3	4.8		
Continuation of Treatment					13.78	.032
No more treatment when symptoms are no longer observed	66.7	53.6	39.1	33.3		
Not important if treatment continues after symptoms are no longer observed	26.2	21.4	30.4	42.9		
Important to continue to need treatment	7.1	25.0	30.4	23.8		

Table 1 Continued…

Variable	Cluster 1 N=42	Cluster 2 N=28	Cluster 3 N=23	Cluster 4 N=42	X_2	*p*
Awareness of Condition					11.05	NS
Treatment to keep child unaware of condition	0.0	7.1	4.3	0.0		
Not important for child to be aware of condition	14.3	7.1	0.0	19.0		
Treatment to help child be aware of condition	85.7	85.7	95.7	81.0		
Medication Treatment					25.84	<.001
No medication	0.0	25.0	0.0	14.3		
Low dose of medication	92.9	53.6	65.2	73.8		
High dose of medication	7.1	21.4	34.8	11.9		
Brain-based Treatment					44.55	<.001
No brain-based treatment	26.2	35.7	95.7	16.7		
Some sessions of brain-based treatment	66.7	53.6	4.3	69.0		
40 sessions of brain-based treatment	7.1	10.7	0.0	14.3		

VITA

Rebecca completed her Bachelors of Arts in Psychology with a minor in Spanish at Stephen F. Austin State University in 2014. During her time as an undergraduate, she volunteered as a Research Assistant at the Applied Biopsychology Laboratory conducting neuropsychological research. She was accepted into the School Psychology Master's and Doctoral program in the Fall of 2014. Rebecca worked as a Graduate Assistant for Dr. Luis Aguerrevere and a Research Assistant for the Human Neuroscience Laboratory as well as a Graduate Assistant at the School Psychology Assessment Center. Rebecca completed a Masters of Arts degree in 2018 and went on to complete a Pre-Doctoral Internship at the Center for Psychological Services in Arlington, TX in 2018. After completion of her internship hours, Rebecca worked as a bilingual Licensed Specialist in School Psychology (LSSP) for Mansfield ISD while completing her dissertation. Currently, Rebecca continues to work as a bilingual LSSP and is seeking a Doctorate in School Psychology from Stephen F. Austin State University.

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Publication Manual of the American Psychological Association (Seventh Edition)

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